United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with the
Regents of the University
of California (Agricultural
Experiment Station)

Soil Survey of Merced County, California, Western Part

How To Use This Soil Survey

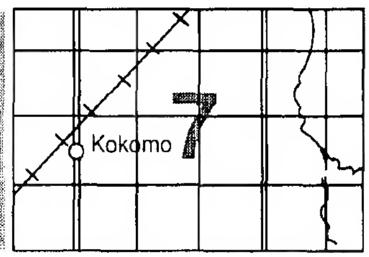
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

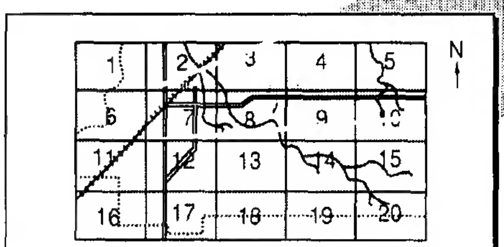
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



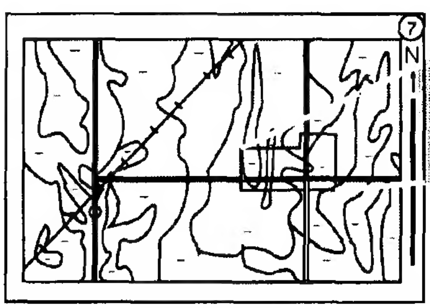
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

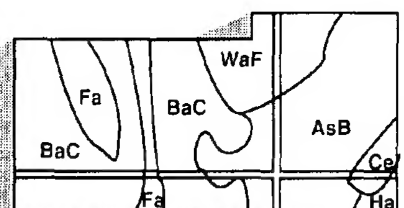


INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the Soil Conservation Service and the Regents of the University of California (Agricultural Experiment Station). It is part of the technical assistance furnished to the local resource conservation districts, the local governments, and the public at large.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Area of Escano clay loam, partially drained, northeast of Los Banos, that is used for growing almonds and walnuts.

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Issued March 1990

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Merced County, Western Part. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Eugene E. Andreuccetti
State Conservationist
Soil Conservation Service

Location of Merced County, western part, in California. The star indicates Sacramento, the state capital.

Soil Survey of Merced County, California, Western Part

By Paul G. Nazar, Soil Conservation Service

Fieldwork by Griffith S. Jones, John P. Osborn, John E. Hansen, Paul W. Benedict, Donald G. Pittman, Richard W. Scully, and Paul G. Nazar, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Regents of the University of California (Agricultural Experiment Station)

The survey area is mainly in the northern part of the San Joaquin Valley. It has a total area of 609,820 acres.

The survey area spans the San Joaquin River and extends to the crest of the Coast Range. The southwestern part of the area is in the mountains of the Coast Range. This part of the area descends abruptly to the adjacent foothills, and the foothills descend to low terraces. The low terraces are adjacent to the alluvial fans of the San Joaquin Valley. The alluvial fans slope gently northeasterly to the rim and basin of the San Joaquin Valley. Elevation of the survey area ranges from 50 feet near the San Joaquin River to 3,801 feet at Laveaga Peak in the Coast Range.

Los Banos, with a population of nearly 11,000, is the largest and most industrialized community in the area. Dos Palos and Gustine are the other two large communities.

Agricultural products are the main commodity produced in this area, and most other industries are related to agriculture. Processing plants such as dairy creameries, vegetable canneries, and melon packing sheds are among the latter industries.

Two main highways, Interstate 5 and California Highway 152, are the main routes used for local and interstate transportation. A network of railroad spur lines provides freight transportation from all of the large communities. Airports are used mostly for general aviation and commercial crop dusting.

An older survey, "Soil Survey of the Los Banos Area, California," was published in 1952 *(12)*. This earlier survey covers a part of the present survey. The present survey, however, updates the earlier one and provides additional information and larger maps that show the soils in greater detail.

This soil survey was undertaken at the request of local resource conservation districts. It was designed with the needs of local users in mind. Local users such as resource conservation districts, county and city units of government, private real estate companies, the Farm Bureau, and the public at large were consulted.

This soil survey area borders the survey areas of San Benito County, California; Merced Area, California; and Eastern Santa Clara County Area, California. Descriptions, names, and delineations of soils in this survey do not fully agree with those on soil maps for these adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey.

General Nature of the Survey Area

This section briefly discusses the climate, agricultural water supply, and use and vegetation in the survey area.

Climate

The varied physiography and relief of the survey area result in a varied climate. From November to May the

climate is cool and moist. From May to November it is warm or hot and is dry. In mid to late summer temperatures often exceed 100 degrees F. Precipitation is mostly in the form of rain, but there is some snow in the mountains. Precipitation ranges from about 8 to 13 inches in the San Joaquin Valley, 9 to 14 inches in the foothills, and 13 to 24 inches in the mountains.

The climate of the lower parts of the survey area is typified by data from Los Banos and Los Banos Arburua Ranch and from Newman, which borders the survey area. The climate at the higher elevations is typified by data from Stayton Mine. Data for areas adjacent to or between those stations are interpolated from data from bordering areas of other counties. Other available stations were not used because they appear to be in a rain shadow.

Table 1 gives data on temperature and precipitation for Los Banos and Newman, which are in the San Joaquin Valley. This table also gives data on precipitation for Los Banos Arburua Ranch and Stayton Mine, which are in the foothills and mountains of the Coast Range *(16, 17, 18)*.

In Los Banos and Newman the mean daily temperature in summer is in the upper 70's. During the hottest part of the day, in the afternoon, temperatures rise into the 90's or low 100's; in the evening temperatures drop because of northwesterly breezes. In winter the mean daily temperatures drop to the mid-40's. The coldest part of the day is early in the morning, when temperatures drop to 32 degrees or lower on some days.

Los Banos, at an elevation of 112 feet, receives nearly 9 inches of precipitation annually. Newman, at an elevation of 90 feet, receives nearly 11 inches annually. All of the precipitation is rain, and most of it falls in November to May.

Los Banos Arburua Ranch, at an elevation of 850 feet, receives nearly 10 inches of precipitation annually. Most of this falls as rain in November to May. Stayton Mine, at an elevation of 2,760 feet, receives more than 23 inches of precipitation annually. Most of the precipitation falls as rain in October to June; however, some snow falls annually but is unpredictable.

In 7 years out of 10, the frost-free period above 32 degrees is 253 days at Los Banos and 267 days at Newman. The frost-free period usually is from early in March to mid-November. One particular area on terraces and alluvial fans has less frost than can be expected in the rest of the general area. This area is adjacent to the lower end of the foothills and spans the survey area from northwest to southeast. It is a belt-shaped area that is parallel to Interstate 5. The gentle breezes that prevail in this area during the frost-free period reduce the threat of frost.

Wind prevails most of the year. The winds are mainly from the northwest, coming down the San Joaquin Valley, and from the west, coming through the passes of the Coast Range. During stormy periods in winter, the wind usually is southeasterly. The wind at the crest of the Coast Range is so prevalent that oak trees in that area grow parallel to the ground; wind generators are being installed in this area for use as a source of electrical energy. At Romero Overlook on San Luis Reservoir, which is considerably below the mountain crest, winds average 14 miles per hour annually and 20 miles per hour in summer.

Fog is prevalent in the San Joaquin Valley part of the survey area from December to March, when weather conditions for ground fog commonly are present. In some years, a thick layer of fog rises higher in the air and sunshine is not seen for a week or more at a time. A capping of fog or low clouds usually covers the crest of the Coast Range. The fog usually lasts from early in the morning until noon, and from December to May it may last even longer.

Agricultural Water Supply

There are 12 water districts that supply irrigation water in the survey area. Eleven of these supply water for agriculture, and one supplies water for wildlife habitat. Most of the irrigated area is in the San Joaquin Valley; less than one-tenth is in the foothills adjacent to Interstate 5. More than three-fourths of the San Joaquin Valley part has a dependable supply of irrigation water.

Most of the water is supplied by sources outside the survey area. The Delta-Mendota Canal, the California Aqueduct, and the San Joaquin River are outside sources of water. Many districts use irrigation wells, drainage water, and stream runoff to supplement outside sources. Some individual farmers use private irrigation wells as a source of water.

The quality of the water varies with the source and time of the year. Salinity is the greatest problem, but suspended soil particles and boron content are also problems in some of the local water sources.

High mountainous areas have numerous springs. Most of the springs are used for livestock watering; however, some of the large perennial springs are used to irrigate pastures that are in small, isolated areas.

Most of the water used for domestic and industrial purposes is pumped from local subterranean wells.

Use and Vegetation

Most areas in the basin part of the survey area have been protected from flooding, partially drained, and cultivated. The natural vegetation has been replaced by introduced species or has been eliminated by agricultural weeding practices. One small area south of the San Joaquin River and west of Highway 165 is in a native plant preserve; however, this area is also protected from flooding. The preserve area supports such species as saltgrass, alkali sacaton, lippia, alkali heath, soft chess, and filaree; woody species, such as willow, are in the drainageways. Another area, consisting of about 66,000 acres, is purposely inundated annually to provide waterfowl habitat. The vegetation in this area more closely resembles the natural vegetation and consists of species that tolerate wetness or salt, or both. These species include iodinebush, saltgrass, alkali heath, alkali bulrush, and tules.

The alluvial fans of the San Joaquin Valley have been cultivated, and most native plant species have been replaced with introduced species. In isolated areas, where cultivation is inconvenient, tillage is omitted for many years at a time. In these areas annual grasses and forbs dominate the plant cover. Plant species such as soft chess, wild oat, and filaree grow in these areas.

The terraces adjacent to the San Joaquin Valley have been cultivated in many areas; however, most of these terraces are used as rangeland. This rangeland has been grazed heavily by livestock in the past, which probably has altered the natural vegetation. The present system of livestock grazing allows for the perpetuation of annual grasses and forbs. These areas now support such species as soft chess, brome, wild oat, and filaree.

The foothills of the Coast Range are used as rangeland. These areas also have been grazed heavily by livestock in the past, and soil erosion has taken place. The natural vegetation has probably been altered as a result. The present system of livestock grazing allows for the perpetuation of annual grasses and forbs. These areas now support such species as soft chess, ripgut brome, red brome, wild oat, and filaree. Some areas that have been subject to heavier grazing and more severe erosion have brush species such as Mormon tea either established or encroaching. Any scattered oak trees that were present in the natural vegetation were removed many years ago, and the present climate is not conducive to their regeneration. Drainageways that are wet for any significant period of time support many woody and brushy species. Willow, sycamore, tree tobacco, California blackberry, and ceanothus are some of the species that grow. Heavily grazed areas of very shallow soils or bladed roadside areas support wild flowers in spring. These wild flowers include species of California poppy, blue lupine, bluedick, and buttercup.

The mountains of the Coast Range are used as rangeland. Most of the vegetation is annual grasses and forbs with scattered thickets of brush and oak trees. Some areas support grasses and forbs with scattered oak trees. The grasses and forbs in these areas are mainly soft chess, foxtail fescue, wild oat, filaree, and a small amount of perennial grasses such as needlegrass. The brush thickets commonly are California buckwheat with some California sagebrush. There are also small areas of chamise. The oak thickets commonly are at the higher elevations, on north- and east-facing slopes, or on the steeper lower end of side slopes. The trees commonly are blue oak, but many white oak are in the wetter areas and live oak are in the very rocky areas.

The annual grasses and forbs usually start to grow in December following rains. The vegetation at the higher elevations starts to grow earlier and dries out later. The annual grasses and forbs are so dry by June or July that they pose a threat of fire. This is especially so during wet years, when stands of vegetation are dense and livestock leave excess plant residue.

Tables 6 and 7 give more information on the vegetation on individual map units for those soils that are used as rangeland or are suitable for production of commercial trees.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology,

landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge gradually onto one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses and under different levels of management. Some interpretations were modified to fit local conditions, and some new interpretations were developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped into general kinds of landscape for broad interpretive purposes (figs. 1 and 2). Each of the broad groups and the map units in each group are described in the following pages.

The map units on the general soil map for this survey area do not fully agree with those on the general soil maps for adjacent survey areas. The differences are the result of varying soil patterns or modifications in series concepts.

Map Unit Descriptions

Soils in the Basin, on the Basin Rim, and on Alluvial Fans of the San Joaquin Valley

Four map units are in this group. They make up about 36 percent of the survey area.

1. Edminster-Dospalos-Kesterson

Very deep, nearly level, poorly drained soils with hummocky microrelief; in the valley basin

This map unit is adjacent to the San Joaquin River, in the northeastern part of the survey area. The soils in this unit formed in mixed alluvium derived dominantly from granitic rock.

This unit makes up about 3 percent of the survey area. It is about 39 percent Edminster and similar soils, 24 percent Dospalos and similar soils, and 16 percent Kesterson and similar soils. The remaining 21 percent is soils of minor extent.

Edminster soils have a loam surface layer over a mottled, calcareous clay loam subsoil and substratum.

Dospalos soils have a dark-colored clay surface layer over a mottled clay loam subsoil and substratum that in some areas are calcareous.

Kesterson soils have a sandy loam surface layer over a mottled, calcareous clay loam subsoil. The substratum is mottled clay loam and loam and has a thick layer of lime.

Of minor extent in this unit are very deep, poorly drained Xerofluvents, channeled, and Bisgani soils and very deep, very poorly drained Agnal soils and Fluvaquents, channeled. Bisgani soils are loamy sand over sand. Agnal soils are clay throughout the profile. Xerofluvents, channeled, are stratified sand, sandy loam, loam, and clay loam. Fluvaquents, channeled, are stratified sand to clay.

This unit is used mainly as rangeland. It is suited to irrigated pasture and wetland wildlife habitat.

Excess salts, wetness, and hummocky microrelief are the main limitations of the soils in this unit. Edminster soils are also limited by excess sodium.

This unit has poor potential for use as wildlife habitat. The high content of salts and sodium in the soils is the main limitation affecting the diversity and production of

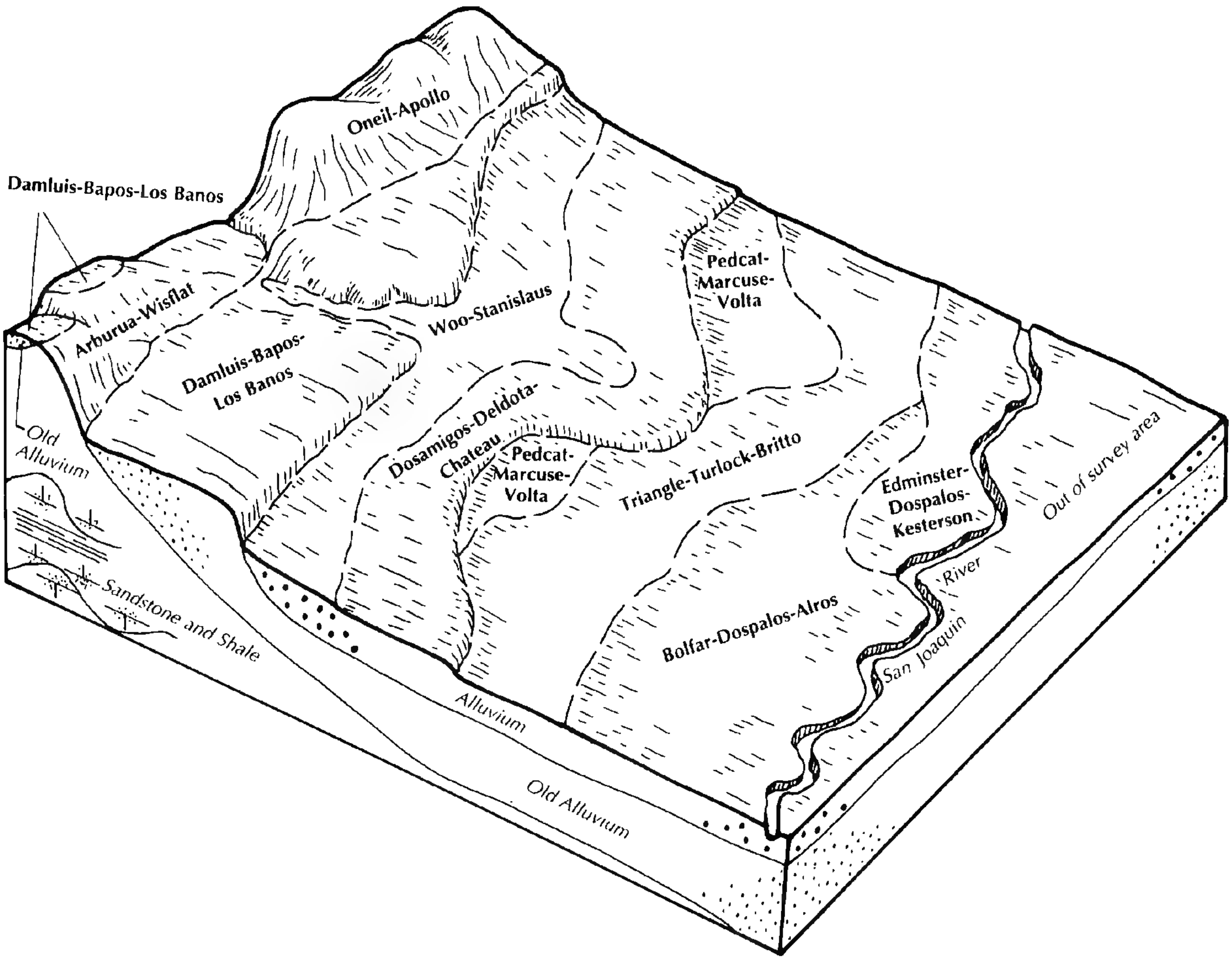

Figure 1.—Typical pattern of the soils and parent material on the western side of the San Joaquin Valley and the low foothills of the Coast Range.

the wild herbaceous plants and shrubs that provide food and cover for wildlife. The development of water facilities such as irrigation systems produces only fair results in improving the habitat, even when combined with the establishment of highly saline-sodic tolerant plants as permanent cover.

The potential for developing wetland wildlife habitat is fair if sufficient water is made available. Historically, these soils have been used for the production of winter wetland wildlife habitat. This primarily involves the production and management of natural plants that are high in food value for waterfowl and management of floodwater during periods of flooding in winter. Some acreage is managed both as wintering habitat for waterfowl and as nesting habitat for resident waterfowl. Providing good nesting habitat requires strict grazing management on adjacent higher land used for cover and maintaining water throughout spring and early in summer for broods.

2. Bolfar-Dospalos-Alros

Very deep, nearly level, poorly drained soils that are partially drained; in the valley basin

This map unit is on flood plains of the valley basin, in the eastern part of the survey area. The soils in this unit formed in mixed alluvium derived dominantly from granitic rock. They formed under conditions of poor

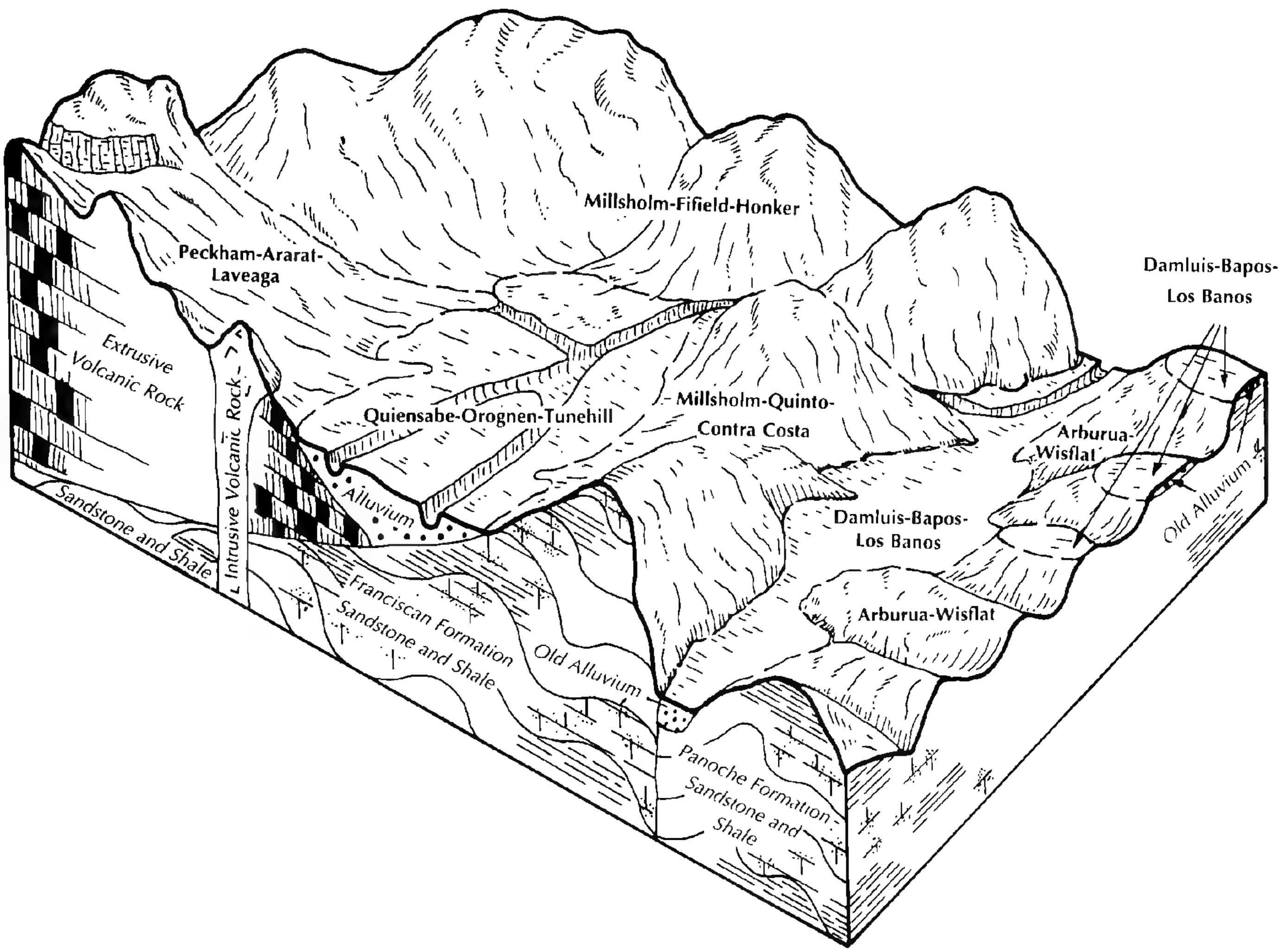

Figure 2.—Typical pattern of the soils and parent material on the mountains and foothills of the Coast Range.

drainage; however, drainage has been improved through the use of open drains.

This unit makes up about 14 percent of the survey area. It is about 36 percent Bolfar and similar soils, 33 percent Dospalos and similar soils, and 14 percent Alros and similar soils. The remaining 17 percent is components of minor extent.

Bolfar soils have a dark-colored, calcareous clay loam surface layer over a mottled, calcareous clay loam and loam subsoil. The substratum is calcareous loam.

Dospalos soils have a dark-colored, mottled, calcareous clay loam surface layer over a mottled, calcareous clay subsoil. The substratum is mottled, calcareous clay loam and sandy clay loam.

Alros soils have a clay loam surface layer. The underlying material is mottled clay loam, loam, and sandy clay loam that includes a thick layer of lime over stratified clay loam, sandy loam, silt loam, and sandy clay loam.

Of minor extent in th s unit are very deep, poorly drained Elnido and Bisgani soils. Elnido soils are sandy loam throughout the profile. Bisgani soils are loamy sand over sand. There are also some small areas of Xerofluvents, channeled, and Fluvaquents, channeled; bodies of water; and small areas of Urban land.

This unit is used mainly for irrigated crops. A few areas are used for urban development.

Wetness is the main limitation of the soils in this unit.

Dospalos and Alros soils are also limited by slow permeability, and Alros soils are limited by excess salts, sodium, and lime.

This unit has fair potential as habitat for openland wildlife. The available water capacity, salinity, and moderate shrink-swell potential of the soils are the main limitations for the growth of shrubs that provide cover for openland wildlife. The development of water facilities such as irrigation systems enhances the value of the habitat on this unit, especially when combined with establishment of saline-sodic tolerant plants as permanent cover.

3. Triangle-Turlock-Britto

Very deep, nearly level, very poorly drained soils; in the valley basin and on the valley basin rim

This map unit is in the area between the Coast Range foothills and the San Joaquin River. The soils in this unit formed under conditions of seasonal flooding and are now artificially ponded.

This unit makes up about 14 percent of the survey area. It is about 36 percent Triangle and similar soils, 31 percent Turlock and similar soils, and 23 percent Britto and similar soils. The remaining 10 percent is soils of minor extent.

Triangle soils formed in mixed alluvium derived dominantly from granitic rock. They have a mottled clay surface layer. Below this are calcareous, mottled clay and clay loam over mottled loam, clay loam, silty clay loam, clay loam, and silty clay.

Turlock soils formed in mixed alluvium derived dominantly from granitic rock. They have a mottled loam and sandy loam surface layer over a mottled clay loam and loam subsoil. The substratum is calcareous, mottled loam, sandy clay loam, silty clay loam, clay loam, and silty clay.

Britto soils formed in mixed alluvium derived dominantly from sedimentary rock. They have a mottled clay loam surface layer over a mottled clay and clay loam subsoil. The substratum is calcareous, mottled sandy clay loam, clay loam, and clay.

Of minor extent in this unit are very deep, very poorly drained Fluvaquents, channeled; very deep, poorly drained Dospalos and Elnido soils; and very deep, somewhat poorly drained Checker soils. Fluvaquents, channeled, are stratified sand to clay. Dospalos soils are clay loam and clay throughout and are calcareous. Elnido soils are sandy loam over loamy sand. Checker soils are loam over clay loam and are calcareous. There are also some small areas of Bolfar and Bisgani soils and bodies of water.

Excess salts and moderate to high shrink-swell potential are the main limitations of the soils in this unit. The Turlock and Britto soils are also limited by excess sodium.

This unit has fair to very poor potential for developing openland wildlife habitat. The high content of salts and sodium and the moderate to high shrink-swell potential of the soils are the main limitations affecting the diversity and production of wild herbaceous plants and shrubs that provide food and cover. The development of water facilities such as irrigation systems produces only fair results in improving the habitat, even when combined with the establishment of highly saline-sodic tolerant plants as permanent cover.

The potential for developing wetland wildlife habitat is fair if sufficient quantities of water are made available. Historically, the main use of the soils in this unit has been for the production of winter wetland habitat. This principally involves the production and management of native plants that are high in food value for waterfowl and management of the floodwater during periods of flooding in winter. Much of the acreage in this unit is managed both as wintering habitat for waterfowl and as nesting habitat for resident waterfowl. Providing good nesting habitat requires strict grazing management on adjacent higher land used for cover and maintaining water throughout spring and early in summer for broods.

4. Pedcat-Marcuse-Volta

Deep and very deep, nearly level, poorly drained soils; on alluvial fans and the valley basin rim

This map unit is in the north-central part of the survey area. The soils in this unit formed in mixed alluvium derived dominantly from sedimentary rock.

This unit makes up about 5 percent of the survey area. It is about 54 percent Pedcat and similar soils, 23 percent Marcuse and similar soils, and 13 percent Volta and similar soils. The remaining 10 percent is soils of minor extent.

Pedcat soils are very deep. They have a loam and clay loam surface layer over a mottled clay and silty clay subsoil. The substratum is mottled clay loam, sandy clay loam, sandy clay, and clay, and in some areas it is calcareous.

Marcuse soils are very deep. They have a silty clay and clay surface layer over a mottled clay and silty clay subsoil and substratum, which are calcareous in some areas.

Volta soils are deep. They have a clay loam surface layer over a mottled clay loam subsoil and substratum.

A hardpan is at a depth of 45 to 55 inches. These soils are calcareous.

Of minor extent in this unit are very deep, somewhat poorly drained Chinvar soils and very deep, poorly drained Henmel soils. Chinvar soils are loam over gravelly loam. Henmel soils are clay loam over silty clay loam, silty clay, and sandy clay. There are also some small areas of Dosamigos soils and bodies of water.

This unit is used mainly as irrigated pastureland and rangeland. Some areas are used for irrigated crops.

Excess salts and sodium, very slow permeability, and wetness are the main limitations of the soils in this unit. Volta soils are also limited by a duripan.

This unit has poor to very poor potential for developing openland wildlife habitat. The high content of salts and sodium, low available water capacity, and high shrink-swell potential of the Marcuse soils limit the diversity and production of wild herbaceous plants and shrubs that provide food and cover. The development of water facilities such as irrigation systems produces only fair results in improving the habitat, even when combined with the establishment of highly saline-sodic tolerant plants as permanent cover.

The potential for developing wetland wildlife habitat is fair if sufficient quantities of water are made available. The main limitation for plant growth is the content of salts and sodium in the soils, and the texture of the soils limits the construction of shallow water areas.

Soils on Alluvial Fans of the San Joaquin Valley

Two map units are in this group. They make up about 17 percent of the survey area.

5. Dosamigos-Deldota-Chateau

Very deep, nearly level, poorly drained and somewhat poorly drained soils that are partially drained; on low alluvial fans

This map unit is adjacent to the valley basin rim, in the central part of the survey area. The soils in this unit formed in mixed alluvium derived dominantly from sedimentary rock.

This unit makes up about 5 percent of the survey area. It is about 41 percent Dosamigos and similar soils, 31 percent Deldota and similar soils, and 23 percent Chateau and similar soils. The remaining 5 percent is soils of minor extent.

Dosamigos soils have a clay loam and clay surface layer over a mottled clay loam and clay subsoil. The substratum is mottled clay loam, sandy clay, and clay, and in some areas it is calcareous.

Deldota soils have a clay loam surface layer over a clay subsoil. The substratum is calcareous clay loam and clay, and it is gleyed in the lower part.

Chateau soils have a mottled clay surface layer over a mottled clay loam, silty clay, and clay subsoil. The substratum is mottled silty clay and clay, and in some areas it has small fragments of strongly weathered, clayey shale.

Of minor extent in this unit are very deep, somewhat poorly drained Chinvar soils and very deep, well drained Stanislaus and Woo soils. Chinvar soils are loam over gravelly loam. Stanislaus soils are clay loam over clay and clay loam. Woo soils are clay loam throughout and are calcareous in the lower part.

This unit is used mainly for irrigated crops and pasture. A few areas are used for urban development.

Wetness and slow permeability are the main limitations of the soils in this unit. Dosamigos and Chateau soils are also limited by excess salts and sodium.

This unit has fair to very poor potential for developing openland and rangeland wildlife habitat. The main limitation of the Dosamigos and Deldota soils is the high shrink-swell potential, which affects the growth of trees and shrubs that provide cover. The main limitation of the Chateau soils is high salinity. The development of irrigation systems on the Dosamigos and Deldota soils enhances the value of the habitat if combined with the establishment of shrubs and trees as permanent cover. Plantings on the Chateau soils must be salt tolerant, and even then only poor results can be expected. The high shrink-swell potential and salinity of the soils in this unit affect the diversity and production of grain and seed crops, domestic grasses, legumes, and shrubs that provide food and cover for wildlife.

The potential of this unit for use as wetland wildlife habitat is fair if sufficient quantities of water are made available.

6. Woo-Stanislaus

Very deep, nearly level to gently sloping, well drained soils; on alluvial fans

This map unit is on the western edge of the valley, adjacent to terraces in the central part of the survey area. The soils in this unit formed in mixed alluvium derived dominantly from sedimentary rock.

This unit makes up about 12 percent of the survey area. It is about 63 percent Woo and similar soils and 31 percent Stanislaus and similar soils. The remaining 6 percent is components of minor extent.

Woo soils have slopes of 0 to 5 percent. They have a loam, clay loam, sandy clay loam, and clay surface

layer over calcareous clay loam, loam, sandy clay loam, sandy loam, and silty clay loam.

Stanislaus soils have slopes of 0 to 2 percent. They have a clay loam surface layer and a clay loam and clay subsoil. The substratum is calcareous loam and clay loam.

Of minor extent in this unit are very deep, well drained Anela soils; very deep, poorly drained to well drained Xerofluvents, extremely gravelly; and Urban land. Anela soils are gravelly loam over very gravelly clay loam and are extremely gravelly in the lower part. Xerofluvents, extremely gravelly, have 60 to 90 percent gravel and cobbles throughout the profile. There are also some small areas of Mollic Xerofluvents, channeled, Pedcat soils, and Xerofluvents, channeled, and bodies of water.

This unit is used mainly for irrigated crops. Some areas are used for urban development.

The main limitation of the soils in this unit is slow permeability.

This unit has fair potential for developing openland wildlife habitat. The main limitations are the high shrink-swell potential, which affects the growth of trees and shrubs, and insufficient rainfall, which affects the production of nonirrigated grain and seed crops. These two vegetative elements are necessary for the development of food and cover. The development of water facilities such as irrigation systems helps to overcome these limitations and enhances the value of the habitat on this unit. Growing irrigated crops in most areas of this unit can provide food, water, and seasonal cover if proper management is used; however, maintaining vegetated odd areas and irrigation ditches greatly improves the attractiveness of the areas to openland wildlife by providing year-round hiding, resting, and nesting areas.

Soils on Terraces Adjacent to the Western Edge of the San Joaquin Valley

One map unit is in this group. It makes up about 8 percent of the survey area.

7. Damluis-Bapos-Los Banos

Very deep, nearly level to strongly sloping, well drained soils; on terraces

This map unit is in transitional areas between the valley and the Coast Range foothills, near the central part of the survey area.

This unit makes up about 8 percent of the survey area. It is about 34 percent Damluis and similar soils, 19 percent Bapos and similar soils, and 18 percent Los Banos and similar soils. The remaining 29 percent is components of minor extent.

Damluis soils formed in alluvium derived from various kinds of rock. They have a clay loam surface layer over a calcareous clay subsoil. The substratum is calcareous gravelly clay loam and gravelly sandy clay loam. The surface layer and subsoil are gravelly in some areas. The content of gravel increases in the substratum.

Bapos soils formed in alluvium derived from various kinds of rock. They have a clay loam and sandy clay loam surface layer over a calcareous clay and clay loam subsoil. The substratum is clay loam and sandy clay loam and is gravelly and very gravelly.

Los Banos soils formed in calcareous, gravelly alluvium derived from various kinds of rock. They have a clay loam surface layer over a calcareous clay loam and clay subsoil. The substratum is calcareous cobbly and gravelly sandy clay loam, and in some areas it is very cobbly and very gravelly.

Of minor extent in this unit are very deep, well drained Ballvar, Pleito, Anela, and Vernalis soils; very deep, somewhat poorly drained to excessively drained Mollic Xerofluvents, channeled; very deep, poorly drained to well drained Xerofluvents, extremely gravelly; very deep, poorly drained Pedcat soils; deep, well drained Chaqua soils; and moderately deep, well drained Arburua soils. Ballvar soils are loam over sandy clay loam. Pleito soils are gravelly clay loam over calcareous clay loam and are gravelly and extremely gravelly in the lower part. Anela soils are very gravelly sandy loam over very gravelly sandy clay loam and extremely gravelly sandy loam. Vernalis soils are clay loam over calcareous silty clay loam. Mollic Xerofluvents, channeled, are sandy loam over gravelly sand. Xerofluvents, extremely gravelly, have 60 to 90 percent gravel and cobbles throughout the profile. Pedcat soils are loam over clay loam and clay. Chaqua soils are calcareous loam over weathered, calcareous sandstone. Arburua soils are calcareous loam over weathered, calcareous shale. There are also some small areas of Pits.

The soils in this unit are used mainly for irrigated and nonirrigated crops, rangeland, and recreation.

With the exception of the Damluis soils, this unit has good potential for developing habitat for both openland and rangeland wildlife. The Damluis soils are poorly suited to openland and rangeland wildlife habitat. The main limitation of the Damluis soils is the high shrink-swell potential, which affects the growth of trees and shrubs. The development of water facilities such as irrigation systems, small ponds, and guzzlers can further enhance the value of the habitat on this unit.

Growing irrigated crops in most areas of this unit can provide food, water, and seasonal cover if managed properly; however, maintaining vegetated odd areas, irrigation ditches, and drainage ditches greatly improves the attractiveness of the areas for openland wildlife by providing year-round hiding, resting, and nesting areas.

Soils on Foothills of the Coast Range

Two map units are in this group. They make up about 19 percent of the survey area.

8. Oneil-Apollo

Moderately deep and deep, gently sloping to steep, well drained soils that have high organic matter content; on foothills

This map unit is between the terraces of Los Banos Valley and those along the western edge of the San Joaquin Valley, near the center of the survey area. Elevation ranges from 200 to 1,400 feet.

This unit makes up about 7 percent of the survey area. It is about 59 percent Oneil and similar soils and 16 percent Apollo and similar soils. The remaining 25 percent is components of minor extent.

Oneil soils are moderately deep. They formed in residuum derived from sandstone and shale. Slope ranges from 8 to 50 percent. These soils have a calcareous silt loam surface layer over calcareous silt loam and silty clay loam. Below this are calcareous sandstone and shale.

Apollo soils are deep. They formed in residuum derived from soft, calcareous sandstone and shale. Slope ranges from 2 to 30 percent. These soils have a calcareous clay loam surface layer over a calcareous clay loam and silty clay loam subsoil. Below this are soft, calcareous sandstone and shale.

Of minor extent in this unit are deep, well drained Ayar soils; moderately deep, somewhat excessively drained Akad soils; moderately deep, well drained Conosta soils; Rock outcrop; shallow, well drained Wisflat soils; and very deep, well drained Damluis soils. Ayar soils are clay over calcareous clay and are underlain by weathered, calcareous shale and sandstone. Akad soils are sandy clay loam over gravelly and very gravelly sandy clay loam and sandy clay and are underlain by sandstone conglomerate. Conosta soils are clay loam over cobbly and gravelly clay loam and clay and are underlain by weathered conglomerate. Wisflat soils are calcareous sandy loam over fractured sandstone. Damluis soils are clay loam over clay and clay loam, are underlain by very gravelly sandy loam, and are calcareous throughout the profile. There are also some small areas of Franciscan soils and Xerofluvents, extremely gravelly.

This unit is used mainly as rangeland. Some areas are used for irrigated and nonirrigated crops, recreation, and wildlife habitat.

This unit has good to fair potential for developing habitat for both rangeland and openland wildlife. The Oneil soils have only fair potential for use as rangeland wildlife habitat because of low available water capacity, which affects the growth of shrubs that provide cover. Apollo soils have good potential for developing rangeland wildlife habitat. The development of water facilities such as irrigation systems, small ponds, and guzzlers can enhance the value of the habitat on this unit if combined with the establishment of permanent plant cover.

9. Arburua-Wisflat

Shallow and moderately deep, gently sloping to very steep, well drained soils that have low organic matter content; on foothills

This map unit is mainly between mountainous areas and the terraces adjacent to the western edge of the San Joaquin Valley, in the south-central part of the survey area. The soils in this unit formed in residuum derived from shale and sandstone. Elevation ranges from 400 to 2,100 feet.

This unit makes up about 12 percent of the survey area. It is about 50 percent Arburua and similar soils and 19 percent Wisflat and similar soils. The remaining 31 percent is components of minor extent.

Arburua soils are moderately deep. Slopes range from 2 to 75 percent. These soils are calcareous loam over weathered, calcareous shale and sandstone that become less weathered as depth increases.

Wisflat soils are shallow. Slope ranges from 8 to 75 percent. These soils have a calcareous sandy loam surface layer over calcareous sandy loam, gravelly sandy loam, and loam. Below this are weathered, calcareous sandstone and shale that become less weathered as depth increases.

Of minor extent in this unit are Rock outcrop; moderately deep, well drained Conosta soils; deep, well drained Ayar soils; and very deep, well drained Vernalis and Los Banos soils. Conosta soils are clay loam over cobbly and gravelly clay loam and clay and are underlain by weathered conglomerate. Ayar soils are clay over calcareous clay and are underlain by weathered, calcareous shale and sandstone. Vernalis soils are clay loam over calcareous silty clay loam. Los Banos soils are clay loam over calcareous clay that is

underlain by clay loam. There are also some small areas of Bapos, San Emigdio, Pedcat, and Ballvar soils; Pits, and Mollic Xerofluvents, channeled.

This unit is used mainly as rangeland and wildlife habitat.

A hazard of erosion and steepness of slope are the main limitations of the soils in this unit. The Wisflat soils are also limited by very low available water capacity.

This unit has fair potential for developing rangeland wildlife habitat. The main management concerns are limited available water capacity and limited soil depth. On the Wisflat soils, these limitations affect the growth of both wild herbaceous plants and perennial shrubs that provide food and cover for wildlife. On the Arburua soils, the growth of shrubs is most affected. The development of water facilities such as small ponds and guzzlers enhances the value of the habitat on the Arburua soils and has fair results in improving the habitat on the Wisflat soils if combined with the establishment of perennial shrub cover.

Soils on Mountains and in Valleys of the Coast Range

Five map units are in this group. They make up about 20 percent of the survey area.

10. Franciscan-Quinto-Rock Outcrop

Shallow and moderately deep, steep and very steep, well drained and somewhat excessively drained soils, and Rock outcrop; on mountains

This map unit is in mountainous areas, dominantly in the northwestern part of the survey area. Elevation ranges from 500 to 2,600 feet.

This unit makes up about 2 percent of the survey area. It is about 41 percent Franciscan and similar soils, 21 percent Quinto and similar soils, and 15 percent Rock outcrop. The remaining 23 percent is soils of minor extent.

Franciscan soils are moderately deep and well drained. They formed in residuum derived from sedimentary and metamorphic rock. Slope ranges from 30 to 75 percent. They have a sandy loam surface layer over a sandy clay loam, clay loam, gravelly sandy clay loam, and gravelly clay loam subsoil. Below this are fractured sedimentary and metamorphic rock.

Quinto soils are shallow and somewhat excessively drained. They formed in residuum derived from sandstone and conglomerate. Slope ranges from 30 to 75 percent. These soils have a gravelly sandy loam surface layer over a gravelly sandy clay loam subsoil. Below this are sandstone and conglomerate.

Rock outcrop consists of exposures of sedimentary, metamorphic, and basic igneous rock and conglomerate.

Of minor extent in this unit are moderately deep, well drained Honker, Sehorn, and Contra Costa soils. Honker soils are sandy loam over sandy clay loam; below this is clay that is underlain by sandstone. Sehorn soils are clay throughout the profile and are underlain by fractured shale and sandstone. Contra Costa soils are loam over clay loam and are underlain by fractured shale.

This unit is used mainly as rangeland and wildlife habitat. Some areas are suited to the production of firewood.

Steepness of slope is the main limitation of the soils in this unit. Quinto soils are also limited by a hazard of erosion and very low available water capacity.

This unit has poor to fair potential for developing rangeland wildlife habitat. The main limitations of the Quinto soils are low available water capacity and shallow depth, which restrict the growth of shrubs that provide food and cover. Although the growth of shrubs on the Franciscan soils is limited, there is good diversity because of the greater depth of the soils and the higher available water capacity. Management for wildlife habitat on this unit consists primarily of maintaining and improving existing habitat through strict control of grazing by livestock. The development of water facilities such as small ponds and guzzlers enhances the value of the habitat, especially on the Franciscan soils.

11. Millsholm-Fifield-Honker

Shallow and moderately deep, moderately sloping to very steep, well drained soils; on mountains

This map unit is in mountainous areas, dominantly in the western part of the survey area. Elevation ranges from 500 to 2,300 feet.

This unit makes up about 5 percent of the survey area. It is about 44 percent Millsholm and similar soils, 32 percent Fifield and similar soils, and 17 percent Honker and similar soils. The remaining 7 percent is components of minor extent.

Millsholm soils are shallow. They formed in residuum derived from sedimentary rock. Slope ranges from 8 to 75 percent. These soils have a loam surface layer and subsoil and are underlain by fractured sandstone and shale.

Fifield soils are moderately deep. They formed in residuum derived from sedimentary and metamorphic rock. Slope ranges from 30 to 65 percent. These soils have a sandy loam surface layer over a very gravelly

loam and very gravelly sandy clay loam subsoil. The substratum is extremely gravelly loam and extremely gravelly sandy loam and is underlain by fractured sedimentary and metamorphic rock.

Honker soils are moderately deep. They formed in residuum derived from sedimentary rock. Slope ranges from 30 to 75 percent. These soils have a surface layer of sandy loam over sandy clay loam, clay loam, and loam. The subsoil and substratum are clay, sandy clay, and clay loam and are underlain by fractured sandstone and shale.

Of minor extent in this unit are Rock outcrop and deep, well drained Asolt soils. Asolt soils are very stony clay over cobbly clay and are underlain by basalt.

This unit is used mainly as rangeland and wildlife habitat. Some areas are suited to the production of firewood.

Steepness of slope is the main limitation of the soils in this unit. Millsholm soils are also limited by very low available water capacity.

This unit has poor to fair potential for developing rangeland wildlife habitat. Generally, growth of wild herbaceous plants is good on this unit; however, the growth of shrubs is restricted. The main limitations on the Millsholm soils are shallow depth and very low available water capacity. The main limitations on the Honker soils are restricted rooting depth and available water capacity. Diverse shrubs grow on the Fifield soils because the underlying bedrock is fractured, which allows deep penetration of roots. Shrubs provide important food and cover for rangeland wildlife. Management for wildlife habitat on this unit consists mainly of maintaining and improving the existing habitat through strict control of grazing by livestock. The development of water facilities such as small ponds and guzzlers enhances the value of the habitat, especially on the Fifield soils.

12. Millsholm-Quinto-Contra Costa

Shallow and moderately deep, moderately sloping to very steep, well drained and somewhat excessively drained soils; on mountains

This map unit is in mountainous areas, mainly in the southwestern part of the survey area. Elevation ranges from 600 to 3,700 feet.

This unit makes up about 8 percent of the survey area. It is about 28 percent Millsholm and similar soils, 22 percent Quinto and similar soils, and 19 percent Contra Costa and similar soils. The remaining 31 percent is components of minor extent.

Millsholm soils are shallow and well drained. They formed in residuum derived from sedimentary rock. Slope ranges from 8 to 75 percent. These soils have a loam surface layer and subsoil over fractured sandstone or shale.

Quinto soils are shallow and somewhat excessively drained. They formed in residuum derived from sandstone and conglomerate. Slope ranges from 30 to 75 percent. These soils have a gravelly sandy loam surface layer over a gravelly sandy clay loam subsoil. Below this is sandstone or conglomerate.

Contra Costa soils are moderately deep and well drained. They formed in residuum derived from sedimentary rock. Slope ranges from 30 to 65 percent. They have a loam surface layer over a clay loam and clay subsoil. Below this is fractured sandstone or shale.

Of minor extent in this unit are Rock outcrop and moderately deep, well drained Fifield, Franciscan, and Gonzaga soils. Fifield soils are sandy loam over very gravelly loam; below this is extremely gravelly loam underlain by sedimentary and metamorphic rock. Franciscan soils are sandy loam over sandy clay loam; below this is gravelly sandy clay loam underlain by fractured sedimentary and metamorphic rock. Gonzaga soils are loam over gravelly sandy clay loam; below this is gravelly sandy clay underlain by highly weathered sedimentary and metamorphic rock. There are also some small areas of Carranza soils and Mollic Xerofluvents, channeled.

This unit is used mainly as rangeland and wildlife habitat.

Steepness of slope is the main limitation of the soils in this unit. Millsholm and Quinto soils are also limited by very low available water capacity, and Quinto soils are limited by a hazard of erosion.

The Millsholm and Quinto soils have fair to poor potential for developing rangeland wildlife habitat. These soils are limited mainly by restricted depth and very low available water capacity, which limit the growth of shrubs that provide food and cover. Management for wildlife habitat on these soils consists mainly of maintaining and improving existing habitat through strict control of grazing by livestock. The development of water facilities such as small ponds and guzzlers increases the value of the habitat, especially if shrubs are planted nearby. Contra Costa soils have good potential for both rangeland and woodland wildlife habitat. There are essentially no limitations for the development of either kind of habitat on these soils.

13. Quiensabe-Orognen-Tunehill

Shallow, moderately deep, and very deep, gently sloping to steep, well drained soils; on terraces

This map unit is in valleys in mountainous areas, in the southwestern part of the survey area. Elevation ranges from 1,200 to 1,800 feet.

This unit makes up about 1 percent of the survey area. It is about 40 percent Quiensabe and similar soils, 35 percent Orognen and similar soils, and 20 percent Tunehill and similar soils. The remaining 5 percent is soils of minor extent.

Quiensabe soils are moderately deep. They formed in alluvium derived dominantly from sedimentary and metamorphic rock. Slope ranges from 30 to 50 percent. These soils have a sandy clay loam and clay loam surface layer over a clay loam and gravelly clay subsoil. The substratum is gravelly and very gravelly clay underlain by fractured sandstone.

Orognen soils are very deep. They formed in alluvium derived mainly from sedimentary and metamorphic rock. Slope ranges from 2 to 50 percent. These soils have a sandy loam surface layer over a clay loam, sandy clay, and clay subsoil. The substratum is gravelly sandy clay loam, gravelly clay loam, and clay loam.

Tunehill soils are shallow. They formed in alluvium derived mainly from basic igneous rock. Slope ranges from 30 to 50 percent. These soils have a loam surface layer over a loam and silt loam subsoil. Below this is consolidated volcanic sediment.

Of minor extent in this unit are very deep, somewhat poorly drained to excessively drained Mollic Xerofluvents, channeled, and very deep, moderately well drained Cole Variant soils. Mollic Xerofluvents, channeled, are sandy loam over extremely gravelly sand. Cole Variant soils are clay loam over clay that is underlain by clay loam.

This unit is used mainly as rangeland and wildlife habitat.

Steepness of slope is the main limitation of the soils in this unit. Tunehill soils are also limited by a hazard of erosion and very low available water capacity.

Quiensabe and Orognen soils have fair potential for developing rangeland wildlife habitat, and Tunehill soils have poor potential. Shrub growth, an essential element of rangeland wildlife habitat, is limited mainly by the restricted available water capacity within the root zone.

Management for wildlife habitat on this unit consists mainly of protecting and maintaining the existing habitat. The development of water facilities such as small ponds and guzzlers enhances the value of the habitat on the Quiensabe and Orognen soils, especially when combined with establishment of a shrub cover nearby.

14. Peckham-Ararat-Laveaga

Moderately deep and deep, gently sloping to very steep, well drained soils; on volcanic mountains

This map unit is in mountainous areas, mainly in the western part of the survey area. Elevation ranges from 500 to 3,800 feet.

This unit makes up about 4 percent of the survey area. It is about 26 percent Peckham and similar soils, 24 percent Ararat and similar soils, and 20 percent Laveaga and similar soils. The remaining 30 percent is components of minor extent.

Peckham soils are moderately deep. They formed in residuum derived from volcanic tuff conglomerate. Slope ranges from 2 to 50 percent. These soils have a cobbly loam surface layer. The upper part of the subsoil is very cobbly loam and very cobbly sandy clay loam, and the lower part is extremely cobbly clay. Below this is fractured volcanic tuff conglomerate.

Ararat soils are deep. They formed in residuum derived from volcanic tuff conglomerate. Slope ranges from 5 to 75 percent. The surface layer is extremely stony loam over very stony loam, very bouldery loam, and very stony sandy clay loam. The subsoil is extremely stony and extremely bouldery sandy clay loam and extremely stony loam. Below this is fractured volcanic tuff conglomerate.

Laveaga soils are deep. They formed in residuum derived from andesitic flow material and andesitic agglomerate. Slope ranges from 30 to 75 percent. The surface layer is sandy clay loam, clay loam, and very stony clay loam. The upper part of the subsoil is sandy clay, clay, and clay loam, and the lower part is sandy loam, loam, and sandy clay loam. Below this is strongly weathered andesitic flow material that crushes to loam.

Of minor extent in this unit are Rock outcrop; deep, well drained Asolt, Lecrag, and Altamont Variant soils; and very deep, moderately well drained Cole Variant soils. Asolt soils are very stony clay over cobbly clay and are underlain by basalt. Lecrag soils are clay over sandy clay; below this is sandy clay loam underlain by highly weathered andesitic flow material. Altamont Variant soils are clay throughout and are underlain by strongly weathered basalt. Cole Variant soils are clay loam over clay and are underlain by loam. There are also some small areas of Pits, Oneil soils, and Mollic Xerofluvents, channeled.

This unit is used mainly as rangeland and wildlife

habitat. Some areas are suited to the production of firewood.

Steepness of slope and stones and cobbles on the surface are the main limitations of the soils in this unit. Peckham soils are also limited by low available water capacity.

Peckham and Ararat soils have poor to fair potential for developing rangeland wildlife habitat. Laveaga soils have good potential for this use. On the Peckham and Ararat soils, the growth of wild herbaceous plants is limited because of stones and cobbles on the surface. On the Peckham soils, the growth of shrubs necessary for food and cover is also limited by low available water capacity. Management for wildlife habitat on this unit consists mainly of maintaining the existing habitat; however, development of water facilities such as small ponds and guzzlers produces excellent results in increasing the value of the habitat, particularly on the Ararat and Laveaga soils.

Detailed Soil Map Units

The map units delineated on the detailed maps with this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Woo loam, 0 to 2 percent slopes, is one of several phases in the Woo series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or associations.

A *complex* consists of two or more soils or

miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Ararat-Peckham complex, 8 to 30 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Peckham-Cole Variant association, 2 to 30 percent slopes, is an example.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Pits is an example.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Map Unit Descriptions

101—Agnal clay loam. This very deep, very poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The characteristic plant community is mainly saltgrass, iodinebush, and alkali heath. Elevation is 60 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 61 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 2 inches of the surface layer is gray clay loam and the lower 7 inches is dark gray clay. The upper 22 inches of the underlying material is dark gray and very dark gray clay that has grayish brown mottles and black concretions, and the lower part to a depth of 60 inches or more is calcareous, black clay that has grayish brown mottles. This soil is saline-sodic throughout. In some areas the upper part of the surface layer is clay.

Included in this unit is about 15 percent soils that are similar to this Agnal soil but do not have a surface layer and have moderate to high available water capacity. Also included are small areas of Triangle clay; Triangle clay, sodic; Kesterson loam, ponded; and Britto clay loam. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Agnal soil is very slow. Available water capacity is very low to low because of the content of salts. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through April.

This unit is used mainly for wetland wildlife habitat. It is also used as rangeland.

This unit is suited to habitat for wetland wildlife. It is limited mainly by the content of salts and sodium and the high shrink-swell potential. The sparse grass and the iodinebush provide little food or cover for waterfowl, but the ponded areas in this unit serve as nesting areas. If vegetation improvement is considered, species that are tolerant of wet, saline, and sodic conditions should be selected. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Undesirable plants can be controlled effectively by mechanical and chemical methods if problem areas are small. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left in the ponded area. These mounds serve as drier resting ground and nesting areas for waterfowl. High shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies. Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of plants more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

If this unit is used as rangeland, the production of forage is limited by excess salts and sodium, very low to low available water capacity, and the periods of inundation. Proper livestock management helps to

maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

102—Akad-Conosta association, 30 to 50 percent slopes. This map unit is on foothills. The characteristic plant community is mainly soft chess and wild oat on the Akad soil, and it is mainly soft chess, wild oat, and filaree on the Conosta soil. Elevation is 300 to 1,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 45 percent Akad sandy clay loam and 40 percent Conosta clay loam. The Akad soil is on south- and west-facing slopes, and the Conosta soil is on north- and east-facing slopes.

Included in this unit are small areas of soils that are similar to this Akad soil but have slopes of 50 to 75 percent; Wisflat sandy loam, 15 to 30 percent slopes; Wisflat sandy loam, 30 to 50 percent slopes; and Wisflat sandy loam, 50 to 75 percent slopes. Also included are small areas of Rock outcrop and Arburua loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Akad soil is moderately deep and somewhat excessively drained. It formed in material derived dominantly from mixed conglomerate. Typically, the surface layer is brown sandy clay loam about 3 inches thick. The upper 7 inches of the subsoil is dark reddish brown gravelly and very gravelly sandy clay loam that is 30 to 55 percent gravel, and the lower 7 inches is dark red extremely gravelly sandy clay loam that is 75 percent gravel. The substratum is reddish brown extremely gravelly sandy clay loam about 7 inches thick. It is 80 percent gravel. Sandstone conglomerate is at a depth of 24 inches. Depth to sandstone conglomerate ranges from 20 to 30 inches.

Permeability of the Akad soil is moderately slow. Available water capacity is very low. Effective rooting depth is limited by sandstone conglomerate at a depth of 20 to 30 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Conosta soil is moderately deep and well drained. It formed in material derived dominantly from conglomerate. Typically, the surface layer is brown and dark brown clay loam about 14 inches thick. It is 5 to 10 percent gravel. The upper 5 inches of the subsoil is dark brown cobbly clay loam that is 20 percent cobbles and 10 percent gravel, and the lower 8 inches is strong brown gravelly clay that is 20 percent gravel. The substratum is strong brown very gravelly clay loam about 5 inches thick. It is 10 percent cobbles and 30 percent gravel. Strongly weathered conglomerate is at a depth of 32 inches. In some areas the surface layer is sandy clay loam, loam, or clay. Depth to weathered conglomerate ranges from 20 to 40 inches.

Permeability of the Conosta soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by weathered conglomerate at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by slope and by the very low available water capacity of the Akad soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from depletion of nutrients and from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds, spring developments, and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The Akad soil is in capability subclass VIIe (15), nonirrigated, and the Conosta soil is in capability

subclass VIe (15), nonirrigated.

103—Alros clay loam, partially drained. This very deep, poorly drained soil is in the valley basin. This soil formed under poor drainage; however, drainage has been improved through the use of open drains. Open drains surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray and gray clay loam about 12 inches thick. The upper 11 inches of the substratum is light olive gray clay loam that has light gray mottles, the next 16 inches is white and very pale brown clay loam, and the lower part to a depth of 60 inches or more is pale olive clay loam that has brownish yellow mottles. This soil is calcareous below a depth of 12 inches and has excess lime below a depth of 23 inches. The soil is sodic below a depth of 12 inches and is saline-sodic below a depth of 23 inches. In some areas the surface layer is loam or sandy clay loam, and in some areas the soil is clay throughout.

Included in this unit are small areas of Escano clay loam, partially drained, and Kesterson sandy loam. Also included are small areas of Bisgani loamy sand, partially drained; Bolfar clay loam, partially drained; Elnido sandy loam, partially drained; Dospalos clay loam, partially drained; and Dospalos clay, partially drained. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Alros soil is slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more, but it is restricted by the content of lime at a depth of 18 to 27 inches. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly cotton, sugar beets, and barley. Some areas are used for irrigated pasture and sudangrass and for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness; excess sodium, salts, and lime; and slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. The excess lime below a depth of 23 inches can cause iron chlorosis in some crops. Adding iron supplements can correct this condition. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water and the application of water should be regulated so that water does not stand on the surface and damage the crops. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus allow more acreage to be used for crops. Toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Sulfur and sulfuric acid are among the soil amendments that can be used to reclaim the soil in this unit.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are wetness, slow permeability, the periods of ponding, restricted load supporting capacity, and excess sodium. The slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent

areas. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. Selection of adapted vegetation is critical for establishment of lawns, shrubs, trees, and vegetable gardens until the excessive amount of sodium is reduced.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

104—Alros clay loam. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 70 to 80 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is gray and dark gray clay loam about 17 inches thick. The subsoil is gray clay loam about 5 inches thick. It has very dark gray mottles. The substratum to a depth of 60 inches or more is grayish brown clay loam. It has strong brown mottles. This soil is calcareous in the surface layer and subsoil and is sodic in the surface layer. In some areas the surface layer is clay or sandy clay loam.

Included in this unit is about 20 percent soils that are similar to this Alros soil but have very slow permeability because of sodium in the subsoil. Also included are small areas of soils that are similar to this Alros soil but have excess lime in the substratum. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Alros soil is slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly for irrigated crops, primarily rice and grain sorghum. It is also used as wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness, excess sodium, and slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. The application of water should be regulated so that water does not stand on the surface and damage the crops. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. Drainage may also be needed. Tile or open drains can be used to remove excess water and sodium from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

105—Altamont Variant-Hytop complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community is mainly wild oat and burclover on the Altamont Variant soil, and it is mainly wild oat and soft chess on the Hytop soil. Elevation is 1,000 to 3,200 feet. The average annual precipitation is about 14 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 45 percent Altamont Variant clay and 40 percent Hytop sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to this Hytop soil but are calcareous in the subsoil, Rock outcrop, and Asolt very stony clay, 30 to

50 percent slopes. Also included are small areas of Ararat extremely stony loam, 8 to 30 percent slopes; Laveaga sandy clay loam, 30 to 50 percent slopes; Hytop sandy loam, 50 to 65 percent slopes; and Lecrag clay, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Altamont Variant soil is deep and well drained. It formed in material derived dominantly from basic volcanic rock. Typically, the surface layer is very dark gray clay about 21 inches thick. The upper 8 inches of the underlying material is very dark grayish brown and yellowish brown clay, and the lower part to a depth of 42 inches is olive brown clay. Strongly weathered basalt is at a depth of 42 inches. Slightly weathered basalt is at a depth of 47 inches. Depth to basic volcanic rock ranges from 40 to 50 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 3 inches at the surface.

Permeability of the Altamont Variant soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by basic volcanic rock at a depth of 40 to 50 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Hytop soil is moderately deep and well drained. It formed in material derived dominantly from basic volcanic rock. Typically, the upper 5 inches of the surface layer is pale brown sandy loam and the lower 5 inches is brown sandy clay loam. The subsoil is strong brown and brown clay about 12 inches thick. The substratum is brown and strong brown clay about 4 inches thick. Calcareous, brownish yellow, yellowish red, and white, strongly weathered basic volcanic rock is at a depth of 26 inches. In some areas the surface layer is loam or sandy clay loam. Depth to strongly weathered basic volcanic rock ranges from 20 to 40 inches.

Permeability of the Hytop soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 9 to 16 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The production of forage is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence; excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of sufficient water, cover, and browse. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

106—Anela gravelly loam, 0 to 2 percent slopes. This very deep, well drained soil is on stream terraces and flood plains. It formed in mixed gravelly alluvium derived dominantly from sedimentary rock. Elevation is 140 to 250 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown gravelly loam about 16 inches thick. It is 20 percent gravel. The upper 14 inches of the subsoil is brown very gravelly clay loam that is 50 percent gravel, and the lower 12 inches is brown extremely gravelly clay loam that is 60 percent gravel. The substratum to a depth of 60 inches or more is brown extremely gravelly sandy clay loam that is 80 percent gravel and cobbles. In some areas the surface layer is gravelly clay loam, gravelly sandy clay loam, or clay loam.

Included in this unit are small areas of Damluis clay loam, 0 to 2 percent slopes, and Damluis gravelly clay loam, 2 to 8 percent slopes, which are adjacent to the higher lying areas of this unit, and small areas of Woo clay loam, 0 to 2 percent slopes. Also included are small areas of Stanislaus clay loam and Mollic Xerofluvents, channeled. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Anela soil is moderate. Available

water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

Most areas of this unit are used for irrigated crops, mainly almonds and alfalfa. A few areas are used for urban development.

This unit is suited to irrigated crops. It is limited mainly by the content of gravel and low to moderate available water capacity. These limitations should be considered when planning irrigation systems. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for urban development, the main limitations are the risk of seepage and rare periods of flooding. If the density of housing is moderate to high, community sewage systems may be needed. Roads and streets should be located above the expected flood level.

This map unit is in capability units IIIs-4 (17), irrigated, and IVs-4 (17), nonirrigated.

107—Anela very gravelly sandy loam, 2 to 8 percent slopes. This very deep, well drained soil is on stream terraces and flood plains. It formed in mixed gravelly alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 230 to 1,200 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is grayish brown and brown very gravelly sandy loam about 12 inches thick. It is 45 percent gravel. The upper 6 inches of the subsoil is brown very gravelly loam that is 40 percent gravel, and the lower 24 inches is dark brown extremely gravelly sandy loam that is 60 to 70 percent gravel. The substratum to a depth of 60 inches or more is dark brown extremely gravelly loamy coarse sand that is 60 percent gravel. In some areas the surface layer is very gravelly sandy clay loam or gravelly sandy loam.

Included in this unit are small areas of Mollic Xerofluvents, channeled, in drainageways. Also included are small areas of Anela very gravelly sandy loam, 8 to 15 percent slopes, adjacent to the higher lying areas, and Anela gravelly loam, 0 to 2 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Anela soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for irrigated crops and urban development.

If this unit is used as rangeland, the production of forage is limited by low rainfall and the low available water capacity. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits, doves, deer, and quail. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams and channels provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to irrigated crops. It is limited mainly by the low available water capacity, excess gravel, and, in some areas, steepness of slope. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Because of the steepness of slope in some areas, sprinkler or trickle irrigation is best suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, runs should be on the contour. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope.

If this unit is used for urban development, the main limitations are the steepness of slope in some areas, the risk of seepage, and the rare periods of flooding. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the

contour. If the density of housing is moderate to high, community sewage systems may be needed. Roads and streets should be located above the expected flood level.

This map unit is in capability unit IVe-4 (17), irrigated and nonirrigated.

108—Anela very gravelly sandy loam, 8 to 15 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed gravelly alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 300 to 1,300 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown very gravelly sandy loam about 23 inches thick. It is 40 to 60 percent gravel. The upper 9 inches of the subsoil is brown very gravelly sandy loam that is 40 percent gravel, and the lower 28 inches or more is brown and very pale brown very gravelly sandy clay loam and very gravelly clay loam that are 50 to 60 percent gravel. In some areas the surface layer is very gravelly sandy clay loam.

Included in this unit are small areas of Anela very gravelly sandy loam, 2 to 8 percent slopes; Carranza gravelly clay loam, 2 to 8 percent slopes; and Vernalis loam, 2 to 5 percent slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Anela soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by low rainfall and the low available water capacity. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-4 (17), nonirrigated.

109—Apollo clay loam, 2 to 8 percent slopes. This deep, well drained soil is on low foothills. It formed in material derived dominantly from soft, calcareous shale and sandstone. Elevation is 200 to 500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is grayish brown clay loam about 10 inches thick. The subsoil is pale brown and brown clay loam about 31 inches thick. Yellow and light yellowish brown, soft, calcareous shale is at a depth of 41 inches. This soil has excess lime throughout. In some areas the surface layer is silty clay loam, sandy clay loam, or loam. Depth to soft shale or sandstone ranges from 40 to 60 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion.

Included in this unit is about 10 percent Apollo clay loam, 8 to 15 percent slopes, and Apollo clay loam, 15 to 30 percent slopes. Also included are small areas of Oneil silt loam, 15 to 30 percent slopes; Los Banos clay loam, 2 to 8 percent slopes; Damluis clay loam, 0 to 2 percent slopes; and Damluis clay loam, 2 to 8 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Apollo soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is limited by soft shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for irrigated crops, mainly cotton, sugar beets, barley, grain sorghum, and beans. Some areas are used for recreational development. This unit can be used for urban development.

This unit is suited to irrigated crops. It is limited mainly by the steepness of slope in some areas and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Because of the steepness of slope in some areas, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage

should be on the contour or across the slope. The excess lime can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

This unit is suited to recreational development. It is limited by the steepness of slope in some areas, the hazard of erosion, and dustiness. Areas used for recreation can be protected from erosion and dust by maintaining plant cover.

Windbreaks are needed on this unit because of the strong prevailing winds. If the unit is used for windbreaks and environmental plantings, the main limitations are low rainfall and excess lime. Supplemental irrigation may be needed when planting and during dry periods.

If this unit is used for urban development, the main limitations are the moderately slow permeability, moderate shrink-swell potential, depth to soft bedrock, steepness of slope in some areas, and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. The soft bedrock is rippable and therefore is not a serious limitation for most engineering uses. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIIe-1 (15), irrigated, and IVe-1 (15), nonirrigated.

110—Apollo clay loam, 8 to 15 percent slopes. This deep, well drained soil is on low foothills. It formed in material derived dominantly from soft, calcareous shale and sandstone. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 200 to 600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is grayish brown clay loam about 10 inches thick. The subsoil is pale brown and brown clay loam about 31 inches thick. Yellow and light yellowish brown, soft, calcareous shale is at a depth of 41 inches. This soil has excess lime throughout. In some areas the surface layer is silty clay loam or sandy clay loam. Depth to soft shale or sandstone ranges from 40 to 60 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion.

Included in this unit are small areas of Apollo clay loam, 2 to 8 percent slopes; Apollo clay loam, 15 to 30 percent slopes; and Damluis clay loam, 2 to 8 percent slopes. Included areas make up about 5 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Apollo soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is limited by soft shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for irrigated crops, mainly cotton, sugar beets, barley, grain sorghum, and beans. Some areas are used for urban development, annual rangeland, and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by the steepness of slope and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

Because of the steepness of slope, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope. The excess lime can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

This unit is suited to recreational development. It is limited mainly by slope, the hazard of erosion, and dustiness. Areas used for recreation can be protected from erosion and dust by maintaining plant cover.

Windbreaks are needed on this unit because of the strong prevailing winds. If the unit is used for windbreaks and environmental plantings, the main limitations are low rainfall and excess lime. Supplemental irrigation may be needed when planting and during dry periods.

If this unit is used for urban development, the main limitations are the moderately slow permeability, moderate shrink-swell potential, depth to soft bedrock, steepness of slope, and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the

moderately slow permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. The soft bedrock is rippable and therefore is not a serious limitation for most engineering uses. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

If this unit is used as rangeland, the production of forage is limited by the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and to proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), irrigated and nonirrigated.

111—Apollo clay loam, 15 to 30 percent slopes. This deep, well drained soil is on low foothills. It formed in material derived dominantly from soft, calcareous shale and sandstone. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 200 to 600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is grayish brown clay loam about 10 inches thick. The subsoil is pale brown and brown clay loam about 31 inches thick. Yellow and light yellowish brown, soft, calcareous shale is at a depth of 41 inches. This soil has excess lime throughout. In some areas the surface layer is silty clay loam, sandy clay loam, or sandy loam. Depth to soft shale or sandstone ranges from 40 to 60 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion.

Included in this unit are small areas of Apollo clay loam, 2 to 8 percent slopes, and Apollo clay loam, 8 to 15 percent slopes. Included areas make up about 5 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Apollo soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is limited by soft shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the natural plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and to proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided on the steeper slopes. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

112—Ararat extremely stony loam, 5 to 30 percent slopes. This deep, well drained soil is on mountains. It formed in material derived dominantly from volcanic tuff conglomerate. The characteristic plant community is mainly blue oak, wild oat, and soft chess with a total tree canopy of 40 to 50 percent. Elevation is 1,900 to 2,600 feet. The average annual precipitation is about 15 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

Typically, 25 percent of the surface is covered with stones, boulders, and cobbles. The upper 7 inches of the surface layer is brown extremely stony loam that is 25 percent stones, boulders, and cobbles, and the lower 17 inches is reddish brown very stony loam that is 40 percent stones and cobbles. The subsoil is reddish brown extremely stony sandy clay loam about 21 inches thick. It is 65 percent stones and cobbles. Volcanic tuff conglomerate is at a depth of 45 inches. Depth to volcanic tuff conglomerate ranges from 40 to 50 inches. In some areas the surface layer is bouldery sandy clay loam, and in some areas the subsoil is clay.

Included in this unit is about 25 percent soils that are similar to this Ararat soil but are 15 to 35 percent stones and cobbles throughout the profile. Also included are small areas of soils, in springs and drainageways, that are similar to this Ararat soil but are moist 6 months of the year or longer and small areas of Cole Variant clay loam, 2 to 5 percent slopes. Included areas make up about 45 percent of the total acreage.

Permeability of this Ararat soil is moderately slow. Available water capacity is low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 40 to 50 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage is limited by stones, cobbles, and boulders on the surface. If trees and shrubs are managed to create open areas, the soil in this unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Stones, cobbles, and boulders on the surface limit access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Mechanical treatment is not practical because of the stones, cobbles, and boulders on the surface. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by stones, cobbles, and boulders on the surface. The stones, cobbles, and boulders limit the use of equipment. This unit can produce about 14 cords of wood per acre in a stand of trees that average 6 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIs (15), nonirrigated.

113—Ararat-Gonzaga complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Ararat soil is mainly blue oak, soft chess, and wild oat that has a total tree canopy of 40 to 50 percent, and on the Gonzaga soil it is soft chess, wild oat, and blue oak that has a total tree canopy of 15 to 25 percent. Elevation is 2,200 to 2,600 feet. The average annual precipitation is about 15 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 60 percent Ararat extremely stony loam and 20 percent Gonzaga loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Cole Variant clay loam, 2 to 5 percent slopes; Laveaga sandy clay loam, 30 to 50 percent slopes; and soils that are similar to this Ararat soil but are clayey throughout. Also included are small areas of soils, in springs and drainageways, that are similar to this Ararat soil but are moist 6 months of the year or more and small areas of Fifield sandy loam, 30 to 50 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Ararat soil is deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, 25 percent of the surface is covered with stones, boulders, and cobbles. The upper

7 inches of the surface layer is brown extremely stony loam that is 25 percent stones, boulders, and cobbles, and the lower 17 inches is reddish brown very stony loam that is 40 percent stones and cobbles. The subsoil is reddish brown extremely stony sandy clay loam about 21 inches thick. It is 65 percent stones and cobbles. Volcanic tuff conglomerate is at a depth of 45 inches. Depth to volcanic tuff conglomerate ranges from 40 to 50 inches. In some areas the surface layer is bouldery sandy clay loam.

Permeability of the Ararat soil is moderately slow. Available water capacity is low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 40 to 50 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Gonzaga soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary or metamorphic rock. Typically, the upper 16 inches of the surface layer is yellowish brown loam that is 10 percent gravel and the lower 6 inches is brown gravelly sandy clay loam that is 25 percent gravel and cobbles. The subsoil is yellowish red and strong brown gravelly sandy clay about 17 inches thick. It is 20 to 25 percent angular gravel. Slightly weathered, strongly fractured siltstone that has some soil material in the fractures is at a depth of 39 inches. Unweathered, strongly fractured siltstone is at a depth of 43 inches. Depth to slightly weathered sedimentary or metamorphic rock ranges from 20 to 40 inches. In some areas the surface layer is sandy clay loam or clay loam.

Permeability of the Gonzaga soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 12 to 24 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage is limited by slope and by stones, cobbles, and boulders on the surface of the Ararat soil. If trees and shrubs are managed to create open areas, this unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Stones, cobbles, and boulders on the surface of the Ararat soil and steepness of slope limit access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the stones, cobbles, and boulders on the surface of the Ararat soil and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope and by stones, cobbles, and boulders on the surface of the Ararat soil. The stones, cobbles, and boulders limit the use of equipment. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 14 cords of wood per acre in a stand of trees that average 6 to 8 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

114—Ararat-Peckham complex, 8 to 30 percent slopes. This map unit is on mountains. The characteristic plant community on the Ararat soil is mainly blue oak, soft chess, and wild oat with a total tree canopy of 40 to 50 percent, and on the Peckham soil it is soft chess, filaree, and foxtail fescue. Elevation is 800 to 3,300 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 60 percent Ararat extremely stony loam and 20 percent Peckham cobbly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent soils that are similar to this Ararat soil but are in springs and drainageways and are moist 6 months of the year or more. Also included are small areas of soils that are similar to this Ararat soil but are 15 to 35 percent rock

fragments throughout the profile; Rock outcrop; Ararat extremely stony loam, 30 to 50 percent slopes; Peckham cobbly loam, 30 to 50 percent slopes; Illito extremely stony loam, 30 to 50 percent slopes; and soils, northeast of Mount Ararat, that are similar to this Ararat soil but are 50 to 70 inches deep to bedrock. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Ararat soil is deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, 25 percent of the surface is covered with stones, boulders, and cobbles. The upper 7 inches of the surface layer is brown extremely stony loam that is 25 percent stones, boulders, and cobbles, and the lower 17 inches is reddish brown very stony loam that is 40 percent stones and cobbles. The subsoil is reddish brown extremely stony sandy clay loam about 21 inches thick. It is 65 percent stones and cobbles. Volcanic tuff conglomerate is at a depth of 45 inches. In some areas the surface layer is bouldery loam, loam, or bouldery sandy clay loam. Depth to volcanic tuff conglomerate ranges from 40 to 50 inches.

Permeability of the Ararat soil is moderately slow. Available water capacity is low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 40 to 50 inches. Runoff is medium, and the hazard of water erosion is slight.

The Peckham soil is moderately deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, the surface layer is brown cobbly loam about 13 inches thick. It is 10 percent cobbles and 5 percent stones. The upper 7 inches of the subsoil is strong brown very cobbly loam that is 35 percent cobbles and 15 percent stones, and the lower 4 inches is strong brown extremely cobbly clay that is 25 percent cobbles, 15 percent stones, and 30 percent gravel. Volcanic tuff conglomerate is at a depth of 24 inches. In some areas the surface layer is loam, stony loam, or cobbly sandy loam. Depth to volcanic tuff conglomerate ranges from 20 to 30 inches.

Permeability of the Peckham soil is slow. Available water capacity is very low to low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 20 to 30 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage is limited by stones, cobbles, and boulders on the surface of the Ararat soil and by the restricted available water capacity. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Stones, cobbles, and boulders on the surface of the Ararat soil limit access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Mechanical treatment is not practical because of the stones, cobbles, and boulders on the surface of the Ararat soil. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by the stones, cobbles, and boulders on the surface of the Ararat soil. The stones, cobbles, and boulders limit the use of equipment. This unit can produce about 14 cords of wood per acre in a stand of trees that average 6 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIs (15), nonirrigated.

115—Ararat-Peckham complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Ararat soil is mainly blue oak, soft chess, and wild oat with a total tree canopy of 40 to 50 percent, and on the Peckham soil it is soft chess, filaree, and foxtail fescue. Elevation is 900 to 3,400 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 45 percent Ararat extremely stony loam and 40 percent Peckham cobbly loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to this Ararat soil but are in springs and drainageways and have a subsoil that is moist 6 months of the year or more. Also included are small areas of Illito extremely stony loam, 30 to 50 percent slopes; Franciscan sandy loam, 30 to 50 percent slopes, on

north-facing slopes; Ararat extremely stony loam, 8 to 30 percent slopes. Peckham cobbly loam, 8 to 30 percent slopes, and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Ararat soil is deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, 25 percent of the surface is covered with stones, boulders, and cobbles. The upper 7 inches of the surface layer is brown extremely stony loam that is 25 percent stones boulders, and cobbles, and the lower 17 inches is reddish brown very stony loam that is 40 percent stones and cobbles. The subsoil is reddish brown extremely stony sandy clay loam about 21 inches thick. It is 65 percent stones and cobbles. Volcanic tuff conglomerate is at a depth of 45 inches. In some areas the surface layer is bouldery loam, loam, or bouldery sandy clay loam. Depth to volcanic tuff conglomerate ranges from 40 to 50 inches.

Permeability of the Ararat soil is moderately slow. Available water capacity is low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 40 to 50 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Peckham soil is moderately deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, the surface layer is brown cobbly loam about 13 inches thick. It is 10 percent cobbles and 5 percent stones. The upper 7 inches of the subsoil is strong brown very cobbly loam that is 35 percent cobbles and 15 percent stones, and the lower 4 inches is strong brown extremely cobbly clay that is 25 percent cobbles, 15 percent stones, and 30 percent gravel. Volcanic tuff conglomerate is at a depth of 24 inches. In some areas the surface layer is loam, stony loam, or cobbly sandy loam. Depth to volcanic tuff conglomerate ranges from 20 to 30 inches.

Permeability of the Peckham soil is slow. Available water capacity is very low to low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 20 to 30 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage is limited by slope and the restricted available water capacity and by stones, cobbles, and boulders on the surface of the Ararat soil. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. The stones, cobbles, and boulders on the surface of the Ararat soil and steepness of slope limit access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the stones, cobbles, and boulders on the surface of the Ararat soil and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by the steepness of slope and by the stones, cobbles, and boulders on the surface of the Ararat soil. The stones, cobbles, and boulders limit the use of equipment. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 14 cords of wood per acre in a stand of trees that average 6 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

116—Arbuckle Variant sandy loam. This very deep, well drained soil is on low valley terraces. It formed in gravelly alluvium derived from various kinds of rock. Elevation is 120 to 160 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown and light yellowish brown sandy loam about 19 inches thick. It is 10 percent gravel. The subsoil is strong brown gravelly sandy clay loam about 18 inches thick. It is 25 to 30 percent gravel. The substratum to a depth of 60 inches

or more is strong brown and light yellowish brown very gravelly loamy coarse sand. It is 35 to 40 percent gravel. In some areas the surface layer is sandy clay loam or gravelly sandy loam.

Included in this unit are small areas of Bapos sandy clay loam, 0 to 2 percent slopes; Woo sandy clay loam, 0 to 2 percent slopes; Stanislaus clay loam; and Woo clay loam, wet, 0 to 2 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Arbuckle Variant soil is moderately slow in the subsoil and rapid in the substratum. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly alfalfa, corn, sugar beets, and irrigated pasture. A few areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by the low to moderate available water capacity. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are the moderately slow permeability of the subsoil and the risk of seepage in the substratum. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. If the density of housing is moderate to high, community sewage systems may be needed.

This map unit is in capability units IIs-4 (17), irrigated, and IVs-4 (17), nonirrigated.

117—Arburua loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 400 to 1,600 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Included in this unit are small areas of Arburua loam, 15 to 30 percent slopes; Apollo clay loam, 2 to 8 percent slopes; Ayar clay, 5 to 8 percent slopes; Oneil silt loam, 8 to 15 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Los Banos clay loam, 2 to 8 percent slopes; and San Timoteo sandy loam, 8 to 15 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat. The unit can be used for urban development.

The production of forage is limited by the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant

community that has little value as forage. This unit responds to rangeland seeding and to proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are depth to bedrock and steepness of slope. Cuts needed to provide essentially level building sites can expose bedrock. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This map unit is in capability unit IVe-1 (15), nonirrigated.

118—Arburua loam, 8 to 15 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 350 to 1,400 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Included in this unit are small areas of Bapos clay loam, 2 to 8 percent slopes; Arburua loam, 15 to 30 percent slopes; Arburua loam, 30 to 50 percent slopes; Ayar clay, 5 to 8 percent slopes; Ayar clay, 8 to 15 percent slopes; and Wisflat sandy loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, and deer. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

119—Arburua loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material weathered dominantly from calcareous shale and sandstone. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 300 to 1,600 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and

the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes easily to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Included in this unit are small areas of Wisflat sandy loam, 15 to 30 percent slopes; Rock outcrop; soils that are similar to this Arburua soil but are 40 to 60 inches deep to bedrock; Arburua loam, 8 to 15 percent slopes; Arburua loam, 30 to 50 percent slopes; Oneil silt loam, 8 to 15 percent slopes; and Oneil silt loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided on the steeper slopes. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits, doves, and deer. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

120—Arburua loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 400 to 1,600 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Included in this unit are small areas of soils that are similar to this Arburua soil but are clayey throughout and are severely eroded; these soils comprise a 440-acre area about 0.5 mile north of Sweeney Hill Road and about 0.5 mile east of the south fork of Los Banos Creek. Also included are small areas of Wisflat sandy loam, 30 to 50 percent slopes; Wisflat sandy loam, 50 to 75 percent slopes; Arburua loam, 15 to 30 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; and Los Banos clay loam, 2 to 8 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by slope and the eroded surface layer. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the

less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and doves. It is limited mainly by a lack of sufficient water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

121—Asolt very stony clay, 15 to 30 percent slopes. This deep well drained soil is on mountains. It formed in material derived dominantly from basic volcanic rock. The characteristic plant community on this unit is mainly wild oat and soft chess. Elevation is 800 to 2,500 feet. The average annual precipitation is about 13 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

Typically, 0 to 15 percent of the surface is covered with cobbles and 5 to 15 percent with stones. The surface layer is dark reddish gray and dark reddish brown very stony clay about 29 inches thick. It is 15 percent stones and cobbles. The underlying material, to a depth of 42 inches, is brown cobbly clay. It is 30 percent cobbles and stones. Basalt is at a depth of 42 inches. This soil is calcareous throughout and has excess lime below a depth 29 inches. In some areas the surface layer is clay or stony clay. Depth to basic volcanic rock ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 2 inches at the surface.

Included in this unit are small areas of Ararat extremely stony loam, 8 to 30 percent slopes; Asolt very stony clay, 30 to 50 percent slopes; Peckham cobbly loam, 8 to 30 percent slopes; and Rock outcrop. Also included are small areas of soils that are similar to this Asolt soil but do not have lime in the profile. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Asolt soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by basic volcanic rock at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by stones and cobbles on the surface. Stones and cobbles on the surface also limit access by livestock. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Mechanical treatment is not practical because of the stones on the surface. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and doves. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIs (15), nonirrigated.

122—Asolt very stony clay, 30 to 50 percent slopes. This deep, well drained soil is on mountains. It formed in material derived dominantly from basic volcanic rock. The characteristic plant community is mainly wild oat and soft chess. Elevation is 1,000 to 2,500 feet. The average annual precipitation is about 13 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

Typically, 15 to 35 percent of the surface is covered with cobbles and 5 to 15 percent with stones. The surface layer is dark reddish gray and dark reddish

brown very stony clay about 29 inches thick. It is 15 percent stones and 20 percent cobbles. The underlying material, to a depth of 42 inches, is brown cobbly clay. It is 30 percent cobbles and stones. Basalt is at a depth of 42 inches. This soil is calcareous throughout and has excess lime below a depth of 29 inches. In some areas the surface layer is clay or stony clay. Depth to basic volcanic rock ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 2 inches at the surface.

Included in this unit are small areas of Asolt very stony clay, 15 to 30 percent slopes; Millsholm loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Peckham cobbly loam, 5 to 15 percent slopes; Peckham cobbly loam, 8 to 30 percent slopes; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Asolt soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by basic volcanic rock at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by the steepness of slope and stones and cobbles on the surface. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope and stones and cobbles on the surface limit access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the stones and cobbles on the surface and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and doves. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIs (15), nonirrigated.

123—Ayar clay, 5 to 8 percent slopes. This deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly wild oat and red brome. Elevation is 300 to 1,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Included in this unit are small areas of soils that are similar to this Ayar soil but have slopes of 0 to 5 percent; Apollo clay loam, 2 to 8 percent slopes; Ayar clay, 8 to 15 percent slopes; Ayar clay, 15 to 30 percent slopes; Oneil silt loam, 2 to 8 percent slopes; Oneil silt loam, 8 to 15 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Arburua loam, 2 to 8 percent slopes; Arburua loam, 8 to 15 percent slopes; and Arburua loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is slight.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for nonirrigated small grain.

If this unit is used as rangeland, it has few limitations for the production of forage. If the soil in this unit is

grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to range and seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall, steepness of slope, and the clayey texture of the soil. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields. To minimize compaction, sufficient time should be allowed for the soil to dry out before farm machinery is used.

This map unit is in capability unit IVe-5 (15), nonirrigated.

124—Ayar clay, 8 to 15 percent slopes. This deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly wild oat and red brome. Elevation is 350 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Included in this unit are small areas of Ayar clay, 5 to 8 percent slopes; Ayar clay, 15 to 30 percent slopes; Arburua loam, 8 to 15 percent slopes; Arburua loam, 15 to 30 percent slopes; Arburua loam, 30 to 50 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Apollo clay loam, 8 to 15 percent slopes; and Wisflat sandy loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for nonirrigated small grain.

If this unit is used as rangeland, it has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the

year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall, steepness of slope, and the clayey texture of the soil. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soi . Cross-s ope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields. To minimize compaction, sufficient time should be allowed for the soil to dry out before farm machinery is used.

This map unit is in capability unit IVe-1 (15), nonirrigated.

125—Ayar clay, 15 to 30 percent slopes. This deep, well drained soil is on foothills. It formed in materia derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly wild oat and red brome. Elevation is 350 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Included in this unit are small areas of Arburua loam, 8 to 15 percent slopes; Arburua loam, 15 to 30 percent slopes; Arburua loam, 30 to 50 percent slopes; Ayar clay, 5 to 8 percent slopes; Ayar clay, 8 to 15 percent slopes; Wisflat sandy loam, 50 to 75 percent slopes; Apollo clay loam, 8 to 15 percent slopes; and Apollo clay loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided on the steeper slopes. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, deer, and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

126—Ayar clay, 30 to 50 percent slopes. This deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly wild oat and red brome. Elevation is 350 to 900 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown, yellowish brown, and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has

cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Included in this unit are small areas of Oneil silt loam, 30 to 50 percent slopes; Arburua loam, 30 to 50 percent slopes; Ayar clay, 15 to 30 percent slopes; Oquin fine sandy loam, 15 to 30 percent slopes; and Los Banos clay loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

127—Ayar-Arburua complex, 8 to 15 percent slopes. This map unit is on strongly sloping foothills. The characteristic plant community is mainly wild oat and red brome on the Ayar soil, and it is mainly soft chess and foxtail fescue on the Arburua soil. Elevation is 500 to 1,100 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 50 percent Ayar clay and 35 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ayar clay, 5 to 8 percent slopes; Ayar clay, 15 to 30 percent slopes; Ayar clay, 30 to 50 percent slopes; Arburua loam, 2 to 8 percent slopes; Arburua loam, 15 to 30 percent slopes; and Bapos clay loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Ayar soil is deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Permeability of the Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at

a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The Ayar soil has few limitations for the production of forage. The Arburua soil is limited by the eroded surface layer. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the Ayar soil cause fenceposts to be lifted out of the ground. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

128—Ayar-Arburua complex, 15 to 30 percent slopes. This map unit is on foothills. The characteristic plant community is mainly wild oat and red brome on the Ayar soil, and it is soft chess and foxtail fescue on the Arburua soil. Elevation is 300 to 1,100 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 50 percent Ayar clay and 35 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Ayar clay, 5 to 8 percent slopes; Ayar clay, 8 to 15 percent slopes; Arburua loam, 30 to 50 percent slopes; Los Banos clay loam, 2 to 8 percent slopes; and Conosta clay loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Ayar soil is deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Permeability of the Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is high.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective

rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The Ayar soil has few limitations for the production of forage. The Arburua soil is limited by the eroded surface layer. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the Ayar soil cause fenceposts to be lifted out of the ground. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided on the steeper slopes. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, deer, and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

129—Ayar-Arburua complex, 30 to 50 percent slopes. This map unit is on foothills. The characteristic plant community is mainly wild oat and red brome on the Ayar soil, and it is mainly soft chess and foxtail fescue on the Arburua soil. Elevation is 500 to 1,200 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 35 percent Ayar clay and 30 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 25 percent soils that are similar to the Ayar soil but are noncalcareous and are 20 to 40 inches deep to bedrock. Also included are small areas of Conosta clay loam, 30 to 50 percent slopes; Wisflat sandy loam, 30 to 50 percent slopes; and Oneil silt loam, 30 to 50 percent slopes. Included areas make up about 35 percent of the total acreage. The percentage varies from one area to another.

The Ayar soil is deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Permeability of the Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion. In some areas the surface layer is clay loam.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by slope and by the eroded surface layer of the Arburua soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the Ayar soil cause fenceposts to be lifted out of the ground. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, deer, and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

130—Ayar-Oneil complex, 30 to 50 percent slopes. This map unit is on foothills. The characteristic plant community is mainly wild oat and red brome on the Ayar soil, and it is mainly soft chess and wild oat on the Oneil soil. Elevation is 300 to 900 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 50 percent Ayar clay and 35 percent Oneil silt loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Franciscan sandy loam, 30 to 50 percent slopes; Ayar clay, 5 to 8 percent slopes; Ayar clay, 8 to 15 percent slopes; Ayar clay, 15 to 30 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Damluis clay loam, 2 to 8 percent slopes; Arburua loam, 30 to 50 percent slopes; and Wisflat sandy loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Ayar soil is deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the upper 15 inches of the surface layer is grayish brown clay and the lower 17 inches is grayish brown and light yellowish brown clay. The underlying material, to a depth of 47 inches, is yellowish brown and grayish brown clay. Strongly weathered, calcareous, olive and pale brown shale and sandstone are at a depth of 47 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay. Depth to weathered shale or sandstone ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 4 inches at the surface.

Permeability of the Ayar soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by weathered shale or sandstone at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Oneil soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown silt loam about 21 inches thick. The underlying material, to a depth of 29 inches, is yellowish brown silt loam. Calcareous sandstone and shale are at a depth of 29 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay loam, sandy clay loam, or loam. Depth to sandstone or shale ranges from 20 to 40 inches. The upper 25 to 50 percent of the original surface has been lost through erosion.

Permeability of the Oneil soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sandstone or shale at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by slope and by the eroded surface layer of the Oneil soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that

improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the Ayar soil cause fenceposts to be lifted out of the ground. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

131—Ballvar loam, 2 to 8 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess and wild oat. Elevation is 300 to 1,400 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown loam about 15 inches thick. The upper 8 inches of the subsoil is dark yellowish brown loam, and the lower 22 inches is dark yellowish brown and yellowish brown sandy clay loam. The substratum to a depth of 60 inches or more is calcareous, yellowish brown loam. In some areas the surface layer is clay loam, sandy clay loam, silty clay loam, very fine sandy loam, or sandy loam.

Included in this unit are about 15 percent soils that are similar to this Ballvar soil but have a calcareous, clayey subsoil and 10 percent Oneil silt loam, 8 to 15 percent slopes, and Oneil silt loam, 15 to 30 percent slopes. Also included are small areas of Bapos clay loam, 2 to 8 percent slopes, and Vernalis loam, 2 to 5 percent slopes. Included areas make up about 35 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Ballvar soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat and for urban development.

This unit has few limitations for the production of forage. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are steepness of slope, restricted load supporting capacity, and moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability unit IVe-1 (17), nonirrigated.

132—Ballvar-Pedcat, eroded association, 0 to 5 percent slopes. This map unit is on alluvial fans and

flood plains. The characteristic plant community is mainly soft chess and wild oat on the Ballvar soil, and it is mainly spinescale saltbush, red brome, and alkali heath on the Pedcat soil. Elevation is 200 to 900 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 50 percent Ballvar loam and 25 percent Pedcat loam, eroded. The Ballvar soil is in the higher lying, gently sloping areas of the alluvial fans, and the Pedcat soil is on nearly level flood plains where runoff water ponds.

Included in this unit are about 10 percent soils that are similar to this Pedcat soil but have sodium in the subsoil and 10 percent Pedcat clay, severely eroded. Also included are small areas of Vernalis loam, 2 to 5 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Ballvar soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown loam about 15 inches thick. The upper 8 inches of the subsoil is dark yellowish brown loam, and the lower 22 inches is dark yellowish brown and yellowish brown sandy clay loam about 30 inches thick. The substratum to a depth of 60 inches or more is calcareous, yellowish brown loam. In some areas the surface layer is clay loam, sandy clay loam, silty clay loam, very fine sandy loam, or sandy loam.

Permeability of the Ballvar soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

The Pedcat soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is pale brown loam about 1 inch thick. The upper 3 inches of the subsoil is pale brown clay loam, the next 18 inches is brown and yellowish brown silty clay, and the lower 14 inches is light yellowish brown silty clay loam. The substratum to a depth of 60 inches or more is light yellowish brown clay loam that has very dark gray mottles in the upper part. The lower part of the subsoil and the substratum are calcareous. This soil is sodic throughout and is saline-sodic in most layers. In some areas the surface layer is clay loam or silty clay loam. The upper 25 to 75 percent of the surface layer has been lost through erosion.

Permeability of the Pedcat soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is moderate. A seasonal high water table is at a depth of 18 to 36 inches in December through March. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The Ballvar soil has few limitations for the production of forage. The Pedcat soil is limited by excess salts and sodium and the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock grazing should be managed to protect the unit from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Continuous, intensive grazing results in a deterioriated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main limitation is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, doves, and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The Ballvar soil is in capability unit IVe-1 (17), nonirrigated, and the Pedcat soil is in capability subclass VIIw (17), nonirrigated.

133—Bapos sandy clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on terraces. It formed in alluvium derived from various kinds of rock. Elevation is 140 to 170 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown sandy clay loam about 12 inches thick. The upper 8 inches of the subsoil is strong brown clay, and the lower 4 inches is strong brown and reddish yellow clay loam. The upper 10 inches of the substratum is reddish yellow gravelly sandy clay loam, and the lower part to a depth of 60 inches or more is pinkish white and pink gravelly sandy clay loam. This soil is calcareous below a depth of 20

inches. In some areas the surface layer is sandy loam or loam.

Included in this unit is about 15 percent soils that are similar to this Bapos soil but have layers that contain excess lime. Also included are small areas of Arbuckle Variant sandy loam and Damluis clay loam, 0 to 2 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bapos soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more, but it is restricted by the content of clay at a depth of 12 to 24 inches. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly cotton, sugar beets, and alfalfa, and for irrigated pasture. A few areas are used for urban development.

This unit is suited to irrigated crops. It is limited mainly by the very slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for urban development, the main limitations are the very slow permeability, high shrink-swell potential, and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the very slow permeability. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIIs-3 (17), irrigated, and IVs-3 (17), nonirrigated.

134—Bapos clay loam, 2 to 8 percent slopes. This very deep, well drained soil is on dissected terraces. It formed in alluvium derived from various kinds of rock. The characteristic plant community is mainly soft chess, red brome, and filaree. Elevation is 220 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is reddish brown and yellowish red clay loam about 12 inches thick. The upper 26 inches of the subsoil is reddish brown clay, and the lower 7 inches is strong brown clay. The substratum to a depth of 60 inches or more is yellowish red very gravelly clay loam that has black mottles. This soil is calcareous below a depth of 4 inches. In some areas the surface layer is loam or clay.

Included in this unit are about 10 percent Los Banos clay loam, 2 to 8 percent slopes, and 10 percent soils that are similar to this Bapos soil but have a very gravelly clay subsoil. Also included are small areas of Chaqua loam, 2 to 8 percent slopes; Arburua loam, 2 to 8 percent slopes; and Conosta clay loam, 2 to 8 percent slopes. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bapos soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more, but it is restricted by the content of clay at a depth of 12 to 26 inches. Runoff is slow, and the hazard of water erosion is slight to moderate.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for nonirrigated small grain.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits

and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall, very slow permeability, and steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields.

This map unit is in capability unit IVe-3 (17), nonirrigated.

135—Bapos clay loam, 8 to 15 percent slopes. This very deep, well drained soil is on dissected terraces. It formed in alluvium derived from various kinds of rock. The characteristic plant community is mainly soft chess, red brome, and filaree. Elevation is 300 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is reddish brown and yellowish red clay loam about 12 inches thick. The upper 26 inches of the subsoil is reddish brown clay, and the lower 7 inches is strong brown clay. The substratum to a depth of 60 inches or more is yellowish red very gravelly clay loam that has black mottles. This soil is calcareous below a depth of 4 inches. In some areas the surface layer is gravelly clay loam, very gravelly clay loam, or loam, and in some areas the profile is very gravelly below a depth of 30 inches.

Included in this unit are small areas of Conosta clay loam, 8 to 15 percent slopes. Also included are small areas of soils that have a very gravelly clay or cobbly clay surface layer; Los Banos clay loam, 8 to 15 percent slopes; Arburua loam, 8 to 15 percent slopes; and Bapos clay loam, 2 to 8 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bapos soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more, but it is restricted by the content of clay at a depth of 12 to 26 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-3 (17), nonirrigated.

136—Bapos-Arburua complex, 8 to 15 percent slopes. This map unit is on side slopes of dissected terraces and foothills. The characteristic plant community is mainly soft chess, red brome, and filaree on the Bapos soil, and it is mainly soft chess and foxtail fescue on the Arburua soil. Elevation is 400 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 45 percent Bapos clay loam and 40 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Conosta clay loam, 8 to 15 percent slopes; soils that are similar to this Bapos soil but are 10 to 20 inches deep to bedrock; Wisflat sandy loam, 15 to 30 percent slopes; Arburua loam, 15 to 30 percent slopes; and Bapos clay loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Bapos soil is very deep and well drained. It formed in alluvium derived from various kinds of rock. Typically, the surface layer is reddish brown and yellowish red clay loam about 12 inches thick. The

upper 26 inches of the subsoil is reddish brown clay, and the lower 7 inches is strong brown clay. The substratum to a depth of 60 inches or more is yellowish red very gravelly clay loam that has black mottles. This soil is calcareous below a depth of 4 inches. In some areas the surface layer is loam, sandy clay loam, or silt loam, and in some areas the profile is very gravelly below a depth of 30 inches.

Permeability of the Bapos soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more, but it is restricted by the content of clay at a depth of 12 to 26 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The Bapos soil has few limitations for the production of forage. The Arburua soil is limited by the eroded surface layer. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-3 (17), nonirrigated.

137—Bisgani loamy sand, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 115 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown loamy sand about 20 inches thick. It has yellowish brown mottles in the lower part when moist. The underlying material to a depth of 60 inches or more is light gray coarse sand that has olive yellow mottles. The lower part of the underlying material is calcareous. In some areas the surface layer is sandy loam, loam, or clay loam.

Included in this unit is about 15 percent Elnido sandy loam, partially drained, and Elnido clay loam, partially drained. Also included are small areas of Bolfar clay loam, partially drained; Dospalos clay loam, partially drained; Palazzo sandy loam, partially drained; and Xerofluvents, channeled. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bisgani soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. This soil is susceptible to soil blowing if the surface is left dry and barren. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this unit from flooding.

Most areas of this unit are used for irrigated crops, mainly alfalfa, sugar beets, and corn. Among the other crops grown are barley and tomatoes. Some areas are used as wildlife habitat.

This unit is suited to irrigated crops. It is limited

mainly by wetness and by droughtiness of the surface layer. Returning crop residue to the soil in this unit or regularly adding organic matter increases fertility, improves structure, and increases the available water capacity.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown; however, because the water intake rate is rapid, sprinkler irrigation generally is best suited. If furrow irrigation is used, water should be applied at frequent intervals and runs should be short. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies. Soil blowing can be reduced by returning crop residue to the soil and practicing minimum tillage.

This unit provides habitat for wildlife such as doves and pheasants. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover.

This map unit is in capability units IIIw-4 (17), irrigated, and IVw-4 (17), nonirrigated.

138—Bisgani clay loam, occasionally flooded. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky. Numerous sloughs dissect the area. The characteristic plant community is mainly beardless wildrye and saltgrass. Elevation is 60 to 80 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray clay loam about 9 inches thick. It has yellowish brown mottles in the lower part. The upper 6 inches of the underlying material is mottled, grayish brown sandy loam, and the lower part to a depth of 60 inches or more is grayish brown and light gray loamy sand that has yellowish brown mottles. The upper part of the underlying material is calcareous. In some areas the surface layer is loamy sand, sandy loam, or loam.

Included in this unit are about 10 percent Fluvaquents, channeled, and Xerofluvents, channeled, in lower lying areas and channels, and 15 percent Bolfar clay loam, hummocky, and Dospalos clay, hummocky. The percentage varies from one area to another.

Permeability of the Bisgani soil is moderately slow to a depth of 9 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through March. In January through March, this soil is subject to occasional, long periods of flooding from the San Joaquin River and the sloughs. The unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. It is also used as riparian wildlife habitat.

The production of forage is limited by low rainfall and occasional periods of flooding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock operations are impaired by occasional periods of flooding in January through March. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves and for waterfowl during the part of the year when the soil is ponded. The unit is limited mainly by a lack of sufficient cover and water. The San Joaquin River and the sloughs provide important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs.

This map unit is in capability units IIIw-4 (17), irrigated, and IVw-4 (17), nonirrigated.

139—Bolfar clay loam, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray and grayish brown clay loam about 25 inches thick. The upper 4

inches of the subsoil is light gray clay loam that has white mottles, and the lower 12 inches is olive gray and olive loam that has olive yellow mottles. The substratum to a depth of 60 inches or more is olive, olive gray, and gray loam that has yellowish brown mottles. This soil is calcareous to a depth of 53 inches. In some areas the surface layer is loam or sandy loam.

Included in this unit are small areas of Escano clay loam, partially drained; Alros clay loam, partially drained; Dospalos clay loam, partially drained; and Elnido sandy loam, partially drained. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bolfar soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this unit from flooding. This unit is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly cotton, alfalfa (fig. 3), sugar beets, field corn, barley, and tomatoes. Among the other crops grown is cantaloup. Some areas are used for pasture, homesite development, and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are wetness, moderately slow permeability, periods of ponding, restricted load supporting capacity, and moderate shrink-swell potential. The moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent areas. Plants that can tolerate a seasonal high water table and droughtiness should be selected unless drainage and irrigation are provided. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

140—Bolfar clay loam, hummocky. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the area. The characteristic plant community is mainly beardless wildrye, saltgrass, and soft chess. Elevation is 65 to 75 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is calcareous, mottled,

Figure 3.—Alfalfa hay in an area of Bolfar clay loam, partially drained, northeast of Los Banos.

grayish brown and dark gray clay loam about 26 inches thick. The upper 17 inches of the underlying material is grayish brown sandy loam that has dark yellowish brown mottles, and the lower part to a depth of 60 inches or more is light gray and strong brown loam that is saline and has brownish yellow mottles. In some areas the surface layer is loam.

Included in this unit are about 10 percent Elnido sandy loam, partially drained, and 10 percent Xerofluvents, channeled. Also included are small areas of Dospalos clay, hummocky. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Bolfar soil is moderately slow to a depth of 26 inches and moderate below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches in December through March. Large flood control levees and river bypasses are used to protect this unit from flooding. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat. The unit can be used for irrigated crops.

The production of forage on this unit is limited by low rainfall and excess salts. Salt tolerant species should be selected for seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

This unit provides habitat for wildlife such as pheasants, doves, and rabbits and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The San Joaquin River and the sloughs provide important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

If this unit is used for irrigated crops, the main limitations are the hummocky microrelief, wetness, and excess salts. A cropping system that includes crop rotation, use of crop residue, and proper tillage .

improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Sprinkler irrigation is suited to the soil in this unit. Furrow and border irrigation systems can be used in leveled areas. To avoid overirrigating and leaching of plant nutrients applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used as wetland wildlife habitat, outlets should be provided to regulate the depth of the water. The unit is limited mainly by excess salts and moderate shrink-swell potential. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Moderate shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl.

This map unit is in capability units IIw-6 (17), irrigated, and IVw-6 (17), nonirrigated.

141—Britto clay loam. This very deep, very poorly drained soil is on the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The microrelief is hummocky. The characteristic plant community is mainly saltgrass and iodinebush. Elevation is 100 to 130 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light gray clay loam about 1 inch thick. The subsurface layer is light brownish gray clay loam about 4 inches thick. It has reddish yellow mottles. The subsoil is olive gray and light yellowish brown clay about 17 inches thick. It has greenish gray, dark greenish gray, and olive brown mottles, and it is calcareous in the lower part. The substratum to a depth of 60 inches or more is light yellowish brown clay. It has gray, yellow, and brown mottles and has gypsum masses in the lower part. The soil is sodic between depths of 5 and 16 inches and is saline-sodic below a depth of 16 inches. In some areas the surface layer is loam or clay.

Included in this unit is about 10 percent Turlock sandy loam and Agnal clay loam. Also included are small areas of Chateau clay, ponded; Triangle clay, sodic, and Triangle clay adjacent to the lower lying areas; and Checker loam and Edminster loam adjacent to the higher lying areas. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Britto soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in October through March; however, many areas become inundated in some years as water encroaches from ponded areas.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

If this unit is used as rangeland, the production of forage is limited by wetness, excess salts and sodium, and low rainfall. Species that are tolerant of saline-sodic conditions should be selected for seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of adequate water. Sloughs and ponded areas in this unit provide important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs.

If this unit is used as wetland wildlife habitat, outlets should be provided to regulate the depth of the water. The unit is limited mainly by the excess salts and sodium and high shrink-swell potential. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. High shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural,

resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability subclass VIIw (17), nonirrigated.

142—Britto clay loam, leveled. This very deep, very poorly drained soil is on the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 80 to 130 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light gray and light brownish gray clay loam about 5 inches thick. It has reddish yellow mottles. The subsoil is olive gray and light yellowish brown clay about 17 inches thick. It has greenish gray, dark greenish gray, and olive brown mottles, and it is calcareous in the lower part. The substratum to a depth of 60 inches or more is light yellowish brown clay. It has yellow and brown mottles and gypsum masses in the lower part. The soil is sodic between depths of 5 and 16 inches and is saline-sodic below a depth of 16 inches. In some areas texture of the surface layer varies because of leveling.

Included in this unit are small areas of Triangle clay; Triangle clay, sodic; Marcuse clay, leveled; Pedcat clay loam, leveled, 0 to 2 percent slopes; Britto clay loam, ponded; Stanislaus clay loam, wet; and Dosamigos clay, partially drained. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Britto soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in October through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated pasture. Some areas are used for irrigated crops, mainly alfalfa and barley, and a few areas are used as wildlife habitat.

This unit is suited to irrigated pasture. The main limitations are excess salts and sodium, very slow permeability, and wetness. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Irrigation water can be applied by the border or sprinkler methods. Water needs to be applied carefully to prevent the buildup of a high water table during the growing season. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. The concentration of salts and sodium in the surface layer limits plant growth. Leaching the salts from the surface layer is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

If this unit is used for irrigated crops, the main limitations are excess salts and sodium, very slow permeability, and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

This unit provides habitat for wildlife such as doves and pheasants. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

143—Britto clay loam, ponded. This very deep, very poorly drained soil is on the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community is mainly tule bulrush, alkali heath, and Baltic rush. Elevation is 80 to 130 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light gray and light brownish gray clay loam about 5 inches thick. It has reddish yellow mottles. The subsoil is olive gray and light yellowish brown clay about 17 inches thick. It has greenish gray, dark greenish gray, and olive brown mottles, and it is calcareous in the lower part. The substratum to a depth of 60 inches or more is light yellowish brown clay. It has yellow and brown mottles and gypsum masses in the lower part. This soil is sodic between depths of 5 and 16 inches and is saline-sodic below a depth of 16 inches. In some areas the surface layer is clay.

Included in this unit is about 10 percent Triangle clay and Triangle clay, sodic. Also included are small areas of Chateau clay, ponded, and Britto clay loam, leveled. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Britto soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through May.

This unit is used mainly as wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as wetland wildlife habitat. It is limited mainly by the content of salts and sodium and the high shrink-swell potential. Species that are tolerant of wet, saline, and sodic conditions should be selected for planting. Swamp timothy, alkali bulrush, jointgrass, spikerush, and Baltic rush provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable plants can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. The high shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of plants more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

If this unit is used as rangeland, the production of forage is limited by excess sodium and salts and the periods of inundation. Species that are tolerant of saline-sodic conditions should be selected for seeding. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

144—Capay clay loam. This very deep, moderately well drained soil is on low alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 100 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 10 inches of the surface layer is grayish brown clay loam and the lower 5 inches is gray clay loam. The upper 21 inches of the underlying material is dark grayish brown clay, and the lower part to a depth of 60 inches or more is yellowish brown clay loam that has few strongly weathered shale fragments. This soil is calcareous below a depth of 15 inches. When dry, the soil has cracks that extend to a depth of 20 inches and are as wide as 2 inches at the surface. In some areas the surface layer is clay.

Included in this unit are small areas of Alros clay loam, partially drained; Dosamigos clay, partially drained; Henmel clay loam, partially drained; and Stanislaus clay loam. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Capay soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This unit is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated crops, mainly cotton, alfalfa, and barley, and irrigated pasture.

A few areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock water facilities.

If this unit is used for homesite development, the main limitations are the slow permeability, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIs-5 (17), irrigated, and IVs-5 (17), nonirrigated.

145—Capay clay. This very deep, moderately well drained soil is on low alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 120 to 150 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay about 22 inches thick. The upper 17 inches of the underlying material is yellowish brown clay. The upper part has seams of gypsum and is calcareous, and the lower part is 70 percent strongly weathered shale fragments. The lower part of the underlying material to a depth of 60 inches or more is calcareous, light yellowish brown clay. It is 50 percent strongly weathered shale fragments in the upper part. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 2 inches at the surface.

Included in this unit is about 10 percent Deldota clay, partially drained, and small areas of Woo clay, 0 to 2 percent slopes; Woo loam, gravelly substratum, 0 to 2 percent slopes; and Woo clay loam, 0 to 2 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Capay soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This unit is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated crops, mainly alfalfa, cantaloup, cotton, and barley. Among the other crops grown are tomatoes and walnuts. Some areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability and the clay texture of the surface layer. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for homesite development, the main limitations are the slow permeability, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the

slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIs-5 (17), irrigated, and IVs-5 (17), nonirrigated.

146—Carranza gravelly loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess, foxtail fescue, filaree, and wild oat. Elevation is 1,400 to 1,600 feet. The average annual precipitation is about 12 to 13 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 230 days.

Typically, the surface layer is brown gravelly loam about 21 inches thick. It is 15 percent gravel. The subsoil is brown gravelly clay loam about 11 inches thick. It is 15 percent gravel. The upper 23 inches of the substratum is yellowish brown gravelly loam that is 25 percent gravel, and the lower part to a depth of 60 inches or more is yellowish brown extremely gravelly loam that is 60 percent gravel. In some areas the surface layer is loam.

Included in this unit are small areas of Carranza gravelly clay loam, 2 to 8 percent slopes; Anela very gravelly sandy loam, 2 to 8 percent slopes; and soils that are similar to this Carranza soil but have 2 to 15 percent gravel to a depth of 60 inches or more. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Carranza soil is moderate to a depth of 55 inches and moderately slow below this depth. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more, but it is restricted by the content of gravel at a depth of 50 to 60 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat. This unit can be used for nonirrigated small grain.

This unit has few limitations for the production of forage. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and to proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and doves. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall and the content of gravel. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The content of gravel in the surface layer limits the use of equipment.

This map unit is in capability unit IVs-1 (17), nonirrigated.

147—Carranza gravelly clay loam, 2 to 8 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess, foxtail fescue, filaree, and wild oat. Elevation is 400 to 1,800 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is brown gravelly clay loam about 12 inches thick. It is 20 percent gravel. The subsoil is brown clay loam about 10 inches thick. It is 10 percent gravel. The upper 8 inches of the substratum is brown gravelly sandy clay loam that is 30 percent gravel and cobbles, the next 8 inches is strong brown gravelly sandy clay loam that is 25 percent gravel and cobbles, and the lower part to a depth of 60 inches or more is yellowish brown extremely gravelly sandy clay loam that is 75 percent gravel and cobbles. In some areas the surface layer is gravelly sandy clay loam, gravelly loam, or gravelly sandy loam, and in some areas the subsoil is clay.

Included in this unit is about 10 percent soils that are similar to this Carranza soil but have 35 to 65 percent gravel and cobbles throughout the profile. Also included are small areas of Oneil silt loam, 15 to 30 percent

slopes; Oneil silt loam, 30 to 50 percent slopes; Contra Costa loam 30 to 50 percent slopes; Herito loam; and Akad sandy clay loam, 30 to 50 percent slopes. Included areas make up about 35 percent of the total acreage The percentage varies from one area to another.

Permeability of this Carranza soil is moderate to a depth of 38 inches and moderately slow below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more, but it is restricted by the content of gravel at a depth of 35 to 40 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat A few areas are used for nonirrigated small grain.

This unit has few limitations for the production of forage. The main concern is a shortage of water in years of below normal rainfall. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall, the content of gravel, and steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion The content of gravel in the surface layer limits the use of equipment. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields.

This map unit is in capability unit IVe-0 (17), nonirrigated.

148—Carranza-Woo complex, 0 to 2 percent slopes. This map unit is on alluvial fans. Elevation is 150 to 240 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 45 percent Carranza gravelly clay loam and 25 percent Woo loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Xerofluvents, extremely gravelly, along Los Banos Creek. Also included are small areas of Stanislaus clay loam and soils that are similar to the Carranza soils but do not have an extremely gravelly substratum. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Carranza soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown gravelly clay loam about 12 inches thick. The subsoil is brown gravelly clay loam about 10 inches thick. The upper 8 inches of the substratum is brown gravelly sandy clay loam, the next 8 inches is strong brown gravelly sandy clay loam, and the lower part to a depth of 60 inches or more is yellowish brown extremely gravelly sandy loam. This soil is 20 percent gravel to a depth of 38 inches and is 90 percent gravel and cobbles below this depth. In some areas the surface layer is sandy clay loam or loam.

Permeability of the Carranza soil is moderate to a depth of 38 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more, but it is restricted by the content of gravel at a depth of 35 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

The Woo soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is grayish brown and brown loam about 19 inches thick. The upper 19 inches of the underlying material is yellowish brown and pale brown loam, and the lower part to a depth of 60 inches or more is stratified, pale brown gravelly sandy loam and gravelly loamy sand. This soil is calcareous below a depth of 19 inches. In some areas the surface layer is clay loam or sandy clay loam.

Permeability of the Woo soil is moderately slow to a depth of 38 inches and moderately rapid below this depth. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly apricots, walnuts, cantaloup, cotton, and plums. Some areas are used for homesite development. The

Carranza soil can be used as a source of gravel.

The Woo soil is suited to irrigated crops. The Carranza soil is limited mainly by the content of gravel. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer and poor tilth. Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for homesite development, the main limitations are the restricted load supporting capacity, the risk of seepage, moderate shrink-swell potential, and restricted permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. If the density of housing is moderate to high, community sewage systems may be needed. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the restricted permeability.

This map unit is in capability units IIs-0 (17), irrigated, and IVs-0 (17), nonirrigated.

149—Chaqua loam, 2 to 8 percent slopes. This deep, well drained soil is on terraces. It formed in mixed, calcareous alluvium derived dominantly from sedimentary and igneous rock. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 300 to 1,100 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is light yellowish brown and yellowish brown loam about 19 inches thick. The subsoil is brown loam about 16 inches thick. The substratum is strong brown loam about 12 inches thick. Strongly weathered, calcareous sandstone is at a depth of 47 inches. This soil is calcareous throughout and has excess lime between depths of 19 and 35 inches. In some areas the surface layer is clay loam. Depth to strongly weathered sandstone ranges from 40 to 60 inches.

Included in this unit are small areas of Los Banos clay loam, 2 to 8 percent slopes; San Timoteo sandy loam, 2 to 8 percent slopes; Bapos clay loam, 2 to 8 percent slopes; Conosta clay loam, 2 to 8 percent slopes; Ballvar loam, 2 to 8 percent slopes; Vernalis loam, 2 to 5 percent slopes; and Apollo clay loam, 8 to 15 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Chaqua soil is moderately slow. Available water capacity is moderate to high. Effective rooting depth is limited by strongly weathered sandstone at a depth of 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used as rangeland and wildlife habitat and for nonirrigated small grain and irrigated crops. A few areas are used for urban development.

This unit has few limitations for use as rangeland. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall and steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage.

This unit is suited to irrigated crops. It is limited mainly by steepness of slope and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Because of the steepness of slope, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation

water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope. The excess lime in the subsoil can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

If this unit is used for urban development, the main limitations are steepness of slope, moderately slow permeability, depth to soft bedrock, and moderate shrink-swell potential. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Use of sandy backfill for the trench and long absorption lines helps to compensate for the moderately slow permeability. The soft bedrock is rippable and therefore is not a serious limitation for most engineering uses. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

150—Chateau clay, partially drained. This very deep soil is on low alluvial fans adjacent to the valley basin rim. Drainage has been improved through the use of open drains. The soil formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 130 to 160 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay about 15 inches thick. It has yellowish brown mottles when moist. The subsoil is yellowish brown clay about 8 inches thick. It has dark yellowish brown mottles when moist and has gypsum crystals. The substratum to a depth of 60 inches or more is yellowish brown silty clay. It has very dark grayish brown mottles when moist. This soil is saline-sodic throughout. In some areas the surface layer is clay loam.

Included in this unit is about 20 percent Dosamigos clay, partially drained; Deldota clay, partially drained; and Wekoda clay, partially drained. The percentage varies from one area to another.

Permeability of this Chateau soil is slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through March. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used for irrigated crops, mainly sugar beets, cotton, alfalfa, and cantaloup. Among the other crops grown are barley and oat hay. This unit is also used for pasture.

This unit is suited to irrigated crops. It is limited mainly by wetness, excess salts and sodium, the clay texture of the surface layer, and slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This map unit is in capability unit IIIw-6 (17), irrigated, and capability subclass VIw (17), nonirrigated.

151—Chateau clay, ponded. This very deep, poorly drained soil is on alluvial fans adjacent to the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2

percent. The characteristic plant community is mainly spinescale saltbush and Spanish brome. Elevation is 110 to 130 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay about 15 inches thick. It has yellowish brown mottles when moist. The subsoil is yellowish brown clay about 8 inches thick. It has dark yellowish brown mottles when moist and has gypsum crystals. The substratum to a depth of 60 inches or more is yellowish brown silty clay. It has very dark grayish brown mottles when moist. This soil is saline-sodic throughout. In some areas the surface layer is clay loam.

Included in this unit are about 10 percent Britto clay loam, leveled; 10 percent Triangle clay, sodic; and 10 percent Pedcat loam, 0 to 2 percent slopes. The percentage varies from one area to another.

Permeability of this Chateau soil is slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 36 inches below the surface in September through April.

This unit is used mainly as wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as habitat for wetland wildlife. It is limited mainly by the content of salts and sodium and high shrink-swell potential. Species that are tolerant of wet, saline, and sodic conditions should be selected for planting. Swamp timothy, alkali bulrush, joint grass, spikerush, and Baltic rush provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable plants can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the ponded area. These mounds serve as drier resting ground and nesting areas for waterfowl. High shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of plants more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

If this unit is used as rangeland, the production of forage is limited by the content of sodium and salts and the periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

152—Checker loam. This very deep, somewhat poorly drained soil is in higher lying, ponded areas in the valley basin. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community is mainly saltgrass, Spanish brome, Mediterranean barley, and alkali heath. Elevation is 100 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 4 inches of the surface layer is grayish brown loam and the lower 11 inches is pale brown loam. The upper 40 inches of the underlying material is light gray loam and clay loam, and the lower part to a depth of 60 inches or more is light gray clay loam and silty clay that have reddish yellow mottles. This soil is calcareous below a depth of 4 inches, and it has excess lime between depths of 4 and 15 inches and below a depth of 55 inches. The soil is saline-sodic throughout. In some areas the surface layer is sandy loam.

Included in this unit is about 20 percent soils that are similar to this Checker soil but are sandy loam or loamy sand throughout. Also included are small areas of Triangle clay, sodic; Britto clay loam; and Agnal clay loam. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Checker soil is moderate to a

depth of 55 inches and slow below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 48 inches in October through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as wildlife habitat. It is also used as rangeland.

The production of forage on this unit is limited by the content of salts and sodium, low available water capacity, and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water.

This map unit is in capability subclass VIIs (17), nonirrigated.

153—Chinvar loam. This very deep, somewhat poorly drained soil is on alluvial fans and on flood plains of creeks. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 80 to 115 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown and light yellowish brown loam about 13 inches thick. The upper 25 inches of the underlying material is calcareous, yellowish brown and light yellowish brown loam that has brownish yellow and brown mottles in the lower part. Below this to a depth of 60 inches or more is light yellowish brown gravelly sandy loam and very gravelly loam. This soil is saline below a depth of 13 inches. In some areas the surface layer is clay loam, sandy clay loam, or silty clay loam.

Included in this unit is about 15 percent Pedcat loam, 0 to 2 percent slopes; Pedcat clay, 0 to 2 percent slopes, severely eroded; and Dosamigos clay loam, partially drained. Also included is about 10 percent soils that are similar to this Chinvar soil but have underlying material of clay loam or clay; these soils are along lower Garzas Creek. The percentage varies from one area to another.

Permeability of this Chinvar soil is moderate. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches in December through March.

Most areas of this unit are used for irrigated pasture. A few areas are used for irrigated crops, mainly alfalfa, oats, and corn, and for windbreaks, homesite development, and wildlife habitat.

This unit is suited to irrigated pasture. The main limitations are the content of salts in the underlying material and wetness. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Irrigation water can be applied by the border and sprinkler methods. Water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used as pasture. Drainage water should be disposed of properly to maintain the quality of water supplies. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for irrigated crops, the main limitations are the content of salts in the underlying material and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding. Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water

should be disposed of properly to maintain the quality of water supplies.

This unit is suited to windbreaks and environmental plantings. It is limited mainly by low rainfall, the content of salts, and the seasonal high water table. Supplemental irrigation may be needed when planting and during dry periods.

If this unit is used for homesite development, the main limitation is wetness. Deep drainage reduces wetness. If drainage outlets are available, tile drains can be placed around the perimeter of septic tank absorption fields to lower the water table.

This unit provides habitat for wildlife such as rabbits. It is limited mainly by a lack of adequate water and cover. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability units IIIs-6 (17), irrigated, and IVs-6 (17), nonirrigated.

154—Cole Variant clay loam, 2 to 5 percent slopes. This very deep, moderately well drained soil is on high-lying terraces and alluvial fans. It formed in mixed alluvium derived dominantly from basic igneous rock. The characteristic plant community is mainly soft chess, pine bluegrass, and filaree. Elevation is 1,400 to 2 500 feet. The average annual precipitation is about 15 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

Typically, the surface layer is dark gray clay loam about 6 inches thick. The upper 12 inches of the subsoil is dark gray clay, and the lower 14 inches is dark gray clay loam. The substratum to a depth of 60 inches or more is light yellowish brown and olive yellow clay loam that has dark brown mottles. In some areas the surface layer is loam, silt loam, or clay.

Included in this unit are small areas of soils that are similar to this Cole Variant soil but are clay throughout and develop wide cracks when dry. Also included are small areas of Peckham cobbly loam, 2 to 5 percent slopes; Peckham cobbly loam, 8 to 30 percent slopes; and Ararat extremely stony loam, 8 to 30 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Cole Variant soil is slow to a depth of 32 inches and very slow below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more, but it is restricted by the dense substratum at a depth of about 30 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 48 inches in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for pasture and nonirrigated small grain.

This unit has few limitations for use as rangeland. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and to proper grazing use. Plants that tolerate wetness should be seeded. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, wild pigs, doves, and quail. It is limited mainly by a lack of sufficient cover and browse. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to hay and pasture. It is limited mainly by wetness. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Fertilizer is needed to ensure optimum growth of grasses and legumes. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This unit is suited to nonirrigated small grain. It is limited mainly by the slow permeability and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

This map unit is in capability units IIe-3 (17), irrigated, and IIIe-3 (17), nonirrigated.

155—Conosta clay loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from conglomerate. The characteristic plant community is

mainly soft chess, wild oat, and filaree. Elevation is 200 to 1,600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown and dark brown clay loam about 14 inches thick. It is 5 to 10 percent gravel. The upper 5 inches of the subsoil is dark brown cobbly clay loam that is 20 percent cobbles and 10 percent gravel, and the lower 8 inches is strong brown gravelly clay that is 20 percent gravel. The substratum is strong brown very gravelly clay loam about 5 inches thick. It is 10 percent cobbles and 30 percent gravel. Strongly weathered conglomerate is at a depth of 32 inches. In some areas the surface layer is sandy clay loam, loam, or clay. Depth to weathered conglomerate ranges from 20 to 40 inches.

Included in this unit are small areas of soils that are similar to this Conosta soil but have a very slowly permeable layer of dense clay in the subsoil; Arburua loam, 8 to 15 percent slopes; Bapos clay loam, 2 to 8 percent slopes; Chaqua loam, 2 to 8 percent slopes; Damluis gravelly clay loam, 2 to 8 percent slopes; Damluis gravelly clay loam, 8 to 15 percent slopes; Conosta clay loam, 8 to 15 percent slopes; and Conosta clay loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Conosta soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by weathered conglomerate at a depth of 20 to 40 inches. Runoff is slow to medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, doves, and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-3 (15), nonirrigated.

156—Conosta clay loam, 8 to 15 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from conglomerate. The characteristic plant community is mainly soft chess, wild oat, and filaree. Elevation is 300 to 1,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown and dark brown clay loam about 14 inches thick. It is 5 to 10 percent gravel. The upper 5 inches of the subsoil is dark brown cobbly clay loam that is 20 percent cobbles and 10 percent gravel, and the lower 8 inches is strong brown gravelly clay that is 20 percent gravel. The substratum is strong brown very gravelly clay loam about 5 inches thick. It is 10 percent cobbles and 30 percent gravel. Strongly weathered conglomerate is at a depth of 32 inches. In some areas the surface layer is sandy clay loam, loam, or clay. Depth to weathered conglomerate ranges from 20 to 40 inches.

Included in this unit are small areas of soils that are similar to this Conosta soil but have a very slowly permeable layer of dense clay in the subsoil; Bapos clay loam, 2 to 8 percent slopes; Arburua loam, 8 to 15 percent slopes; Arburua loam, 15 to 30 percent slopes; Woo clay loam, 0 to 2 percent slopes; Los Banos clay loam, 2 to 8 percent slopes; and Vernalis loam, 2 to 5 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Conosta soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by weathered conglomerate at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more

desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits, deer, and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-3 (15), nonirrigated.

157—Conosta clay loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from conglomerate. The characteristic plant community is mainly soft chess, wild oat, and filaree. Elevation is 600 to 1,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is brown and dark brown clay loam about 14 inches thick. It is 5 to 10 percent gravel. The upper 5 inches of the subsoil is dark brown cobbly clay loam that is 20 percent cobbles and 10 percent gravel, and the lower 8 inches is strong brown gravelly clay that is 20 percent gravel. The substratum is strong brown very gravelly clay loam about 5 inches thick. It is 10 percent cobbles and 30 percent gravel. Strongly weathered conglomerate is at a depth of 32 inches. In some areas the surface layer is sandy clay loam, loam, or clay. Depth to weathered conglomerate ranges from 20 to 40 inches.

Included in this unit are small areas of Akad sandy clay loam, 30 to 50 percent slopes; Wisflat sandy loam, 15 to 30 percent slopes; Wisflat sandy loam, 30 to 50 percent slopes; Wisflat sandy loam, 50 to 75 percent slopes, Rock outcrop; and Arburua loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Conosta soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by weathered conglomerate at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided on the steeper slopes. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, deer, and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

158—Conosta-Arburua complex, 15 to 30 percent slopes. This map unit is on foothills. The characteristic plant community is mainly soft chess, wild oat, and filaree on the Conosta soil, and it is mainly soft chess and foxtail fescue on the Arburua soil. Elevation is 500 to 1,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 45 percent Conosta clay loam and 40 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Wisflat sandy loam, 15 to 30 percent slopes; Wisflat sandy loam, 30 to 50 percent slopes; Wisflat sandy loam, 50 to 75 percent slopes; Rock outcrop; Los Banos clay loam, 2 to 8 percent slopes; Arburua loam, 8 to 15 percent

slopes; and Arburua loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Conosta soil is moderately deep and well drained. It formed in material derived dominantly from conglomerate. Typically, the surface layer is brown and dark brown clay loam about 14 inches thick. It is 5 to 10 percent gravel. The upper 5 inches of the subsoil is dark brown cobbly clay loam that is 20 percent cobbles and 10 percent gravel, and the lower 8 inches is strong brown gravelly clay that is 20 percent gravel. The substratum is strong brown very gravelly clay loam about 5 inches thick. It is 10 percent cobbles and 30 percent gravel. Strongly weathered conglomerate is at a depth of 32 inches. In some areas the surface layer is sandy clay loam, loam, or clay. Depth to weathered conglomerate ranges from 20 to 40 inches.

Permeability of the Conosta soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by weathered conglomerate at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The upper 17 inches of the underlying material is pale brown and brown loam, and the lower part, to a depth of 32 inches, is strongly weathered, calcareous shale that crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime to a depth of 27 inches. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the eroded surface layer of the Arburua soil. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and to proper grazing use. Mechanical treatment should be avoided on the steeper slopes. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, deer, and wild pigs. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

159—Contra Costa loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from sandstone and shale. The characteristic plant community is mainly soft chess, wild oat, and filaree. Elevation is 600 to 2,100 feet. The average annual precipitation is about 14 to 20 inches, the average annual air temperature is 59 to 62 degrees F, and the average frost-free period is 190 to 240 days.

Typically, the surface layer is brown and yellowish brown loam about 19 inches thick. The upper 13 inches of the subsoil is brown clay loam that is 5 percent gravel, and the lower 7 inches is brown clay loam and strongly weathered shale that crushes to clay loam. Fractured shale is at a depth of 39 inches. Depth to fractured shale or sandstone ranges from 20 to 40 inches. In some areas the surface layer is clay loam.

Included in this unit are small areas of soils, near the western edge of Carrsalitos Flat, that are similar to this Contra Costa soil but are 10 to 20 inches deep and have red colors; Arburua loam, 8 to 15 percent slopes; Conosta loam, 15 to 30 percent slopes; Contra Costa loam, 50 to 65 percent slopes; Millsholm loam, 30 to 50 percent slopes; Quinto gravelly sandy loam, 40 to 75 percent slopes; and Rock outcrop. Also included are small areas of soils, on the Merced County-Santa Clara County line west of Spikes Peak, that are similar to this

Contra Costa soil but have slopes of 5 to 15 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Contra Costa soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by fractured shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, quail, and doves. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

160—Contra Costa loam, 50 to 65 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from sandstone and shale. The characteristic plant community is mainly soft chess, wild oat, and filaree. Elevation is 700 to 1,800 feet. The average annual precipitation is about 14 to 20 inches, the average annual air temperature is 59 to 62 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is brown and yellowish brown loam about 19 inches thick. The upper 13 inches of the subsoil is brown clay loam that is 5 percent gravel, and the lower 7 inches is brown clay loam and strongly weathered shale that crushes to clay loam. Fractured shale is at a depth of 39 inches. In some areas the surface layer is clay loam. Depth to fractured shale or sandstone ranges from 20 to 40 inches.

Included in this unit are small areas of Contra Costa loam, 30 to 50 percent slopes; Millsholm loam, 40 to 75 percent slopes; Quinto gravelly sandy loam, 40 to 75 percent slopes; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Contra Costa soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by fractured shale or sandstone at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is very high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. The steepness of slope also limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling by livestock and the more desirable forage plants have had an opportunity to set seed. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, quail, and doves. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the

drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

161—Damluis clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on low terraces. It formed in alluvium derived from various kinds of rock. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 120 to 300 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 22 inches thick. The subsoil is brown and strong brown clay about 22 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam over strong brown very gravelly sandy loam. It is 55 percent gravel. This soil is calcareous throughout and has excess lime below a depth of 22 inches. In some areas the surface layer is clay.

Included in this unit is about 10 percent Stanislaus clay loam. Also included are small areas of Damluis gravelly clay loam, 0 to 2 percent slopes; Woo loam, 0 to 2 percent slopes; and Woo clay loam, 0 to 2 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another

Permeability of this Damluis soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly alfalfa, beans, cotton, tomatoes, and apricots. Among the other crops grown are walnuts and barley. Some areas are used for irrigated pasture and as rangeland, urban development, wildlife habitat, and recreation areas.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding. Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. The excess lime in the subsoil and substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

If this unit is used for urban development, the main limitations are the slow permeability, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is used for recreational developments such as camp areas, picnic areas, and boat ramps. The main limitation is the slow permeability, which can be overcome by properly designing structures. Windbreaks are needed because of the strong prevailing winds.

This unit is suited to windbreaks and environmental plantings. The main limitations are the low rainfall and excess lime. Supplemental irrigation may be needed

when planting and during dry periods.

This map unit is in capability units IIs-3 (17), irrigated, and IVs-3 (17), nonirrigated.

162—Damluis clay loam, 2 to 8 percent slopes. This very deep, well drained soil is on low terraces. It formed in alluvium derived from various kinds of rock. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 140 to 500 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 22 inches thick. The subsoil is brown and strong brown clay about 22 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam over very strong brown very gravelly sandy loam that is 55 percent gravel. This soil is calcareous throughout and has excess lime below a depth of 22 inches. In some areas the surface layer is loam, gravelly clay loam, or clay, and in some areas the substratum is gravelly clay.

Included in this unit are small areas of Bapos clay loam, 2 to 8 percent slopes; Oneil silt loam, 8 to 15 percent slopes; Stanislaus clay loam; Herito loam; and Damluis clay loam, 0 to 2 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Damluis soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly alfalfa, walnuts, beans, sugar beets, and cotton. Among the other crops grown are corn, tomatoes, cantaloup, and barley. Some areas are used as rangeland, wildlife habitat, urban development, and recreation.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability, steepness of slope, and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Because of the steepness of slope, sprinkler or trickle irrigation is best suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope. The excess lime in the subsoil and substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as pheasants, rabbits, and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are the slow permeability, high shrink-swell potential, restricted load supporting capacity, and steepness of slope. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow pemeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This unit is used for recreational developments such as camp areas, picnic areas, and boat ramps. The main limitation is the slow permeability, which can be overcome by properly designing structures. Windbreaks are needed because of the strong prevailing winds.

This unit is suited to windbreaks and environmental plantings. The main limitations are the low rainfall and excess lime. Supplemental irrigation may be needed when planting and during dry periods.

This map unit is in capability units IIe-3 (17), irrigated, and IVe-3 (17), nonirrigated.

163—Damluis gravelly clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on low terraces. It formed in gravelly alluvium derived from various kinds of rock. Elevation is 160 to 260 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown gravelly clay loam about 21 inches thick. It is 25 percent gravel. The subsoil is brown gravelly clay about 25 inches thick. It is 30 percent gravel. The substratum to a depth of 60 inches or more is reddish yellow gravelly clay loam. It is 30 percent gravel. This soil is calcareous throughout. In some areas the surface layer is gravelly loam, gravelly clay, or clay loam.

Included in this unit are areas of Anela gravelly loam, 0 to 2 percent slopes; Damluis clay loam, 0 to 2 percent slopes; and Stanislaus clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Damluis soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for irrigated crops, mainly cotton and almonds, and for pasture. It is also used as recreation areas.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability and the content of gravel. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This unit is used for recreational developments such as golf courses. The main limitations are the slow permeability and the content of gravel. Windbreaks are needed because of the strong prevailing winds.

This unit is suited to windbreaks and environmental plantings. It is limited mainly by low rainfall. Supplemental irrigation may be needed when planting and during dry periods.

This map unit is in capability units IIs-4 (17), irrigated, and IVs-4 (17), nonirrigated.

164—Damluis gravelly clay loam, 2 to 8 percent slopes. This very deep, well drained soil is on low terraces. It formed in alluvium derived from various kinds of rock. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 170 to 300 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown gravelly clay loam about 22 inches thick. It is 20 percent gravel. The subsoil is brown and strong brown gravelly clay about 22 inches thick. It is 20 percent gravel. The substratum to a depth of 60 inches or more is light gray gravelly clay loam that is 20 percent gravel over strong brown very gravelly sandy loam that is 55 percent gravel. This soil is calcareous throughout and has excess lime below a depth of 22 inches. In some areas the surface layer is clay loam or clay.

Included in this unit is about 10 percent soils that are similar to this Damluis soil but have a surface layer that is 10 to 20 inches thick. Also included are small areas of Conosta clay loam, 2 to 8 percent slopes; Anela gravelly loam, 0 to 2 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Ayar clay, 8 to 15 percent slopes; Herito loam; and Mollic Xerofluvents, channeled. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Damluis soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for nonirrigated small grain, irrigated crops, rangeland, wildlife habitat, and urban development.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall, steepness of slope, and the content of gravel. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Cross-slope cultivation reduces runoff and

erosion and provides for better water intake and storage and thus increases crop yields.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability, the content of gravel, steepness of slope, and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Because of the steepness of slope, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope. The excess lime in the subsoil and substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are the slow permeability, high shrink-swell potential, restricted load supporting capacity, and steepness of slope. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIe-4 (17), irrigated, and IVe-4 (17), nonirrigated.

165—Damluis gravelly clay loam, 8 to 15 percent slopes. This very deep, well drained soil is on low terraces. It formed in alluvium derived from various kinds of rock. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 170 to 230 feet. The average annua precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown gravelly clay loam about 22 inches thick. It is 20 percent gravel. The subsoil is brown and strong brown gravelly clay about 22 inches thick. It is 20 percent gravel. The substratum to a depth of 60 inches or more is light gray gravelly clay loam that is 20 percent gravel over strong brown very gravelly sandy loam that is 55 percent gravel. This soil is calcareous throughout and has excess lime below a depth of 22 inches. In some areas the surface layer is gravelly sandy loam, sandy clay loam, or loam.

Included in this unit are small areas of Damluis gravelly clay loam, 2 to 8 percent slopes; Damluis clay loam, 2 to 8 percent slopes; Oneil silt loam, 8 to 15 percent slopes; Woo clay loam, 0 to 2 percent slopes; and Ballvar loam, 2 to 8 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Damluis soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly for nonirrigated small grain and as rangeland. It is also used as wildlife habitat. It can be used for urban development.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall, the content of gravel, and steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when

it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are the slow permeability, steepness of slope, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability unit IVe-4 (17), nonirrigated.

166—Damluis Variant clay loam. This moderately deep, well drained soil is on low terraces. It formed in alluvium derived from various kinds of rock. Slopes are 0 to 2 percent. Elevation is 200 to 300 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 6 inches thick. The subsoil is dark brown reddish brown and yellowish red clay about 26 inches thick. The next layer is a reddish yellow and yellowish red, calcareous, very gravelly hardpan about 28 inches thick. The underlying material to a depth of 60 inches or more is light olive brown very gravelly coarse sand that is 45 percent gravel. This soil is calcareous throughout. Depth to the indurated hardpan ranges from 25 to 40 inches. In some areas the surface layer is clay.

Included in this unit is about 10 percent soils that are similar to this Damluis Variant soil but have a hardpan at a depth of 40 to 60 inches. Also included are small areas of Apollo clay loam, 2 to 8 percent slopes; Damluis clay loam, 0 to 2 percent slopes; Damluis clay loam, 2 to 8 percent slopes; Los Banos clay loam, 0 to 2 percent slopes; Los Banos clay loam, 2 to 8 percent slopes; and soils that are similar to this Damluis Variant soil but have slopes of 2 to 8 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Damluis Variant soil is slow to a depth of 32 inches and very slow below this depth. Available water capacity is low to moderate. Effective rooting depth is limited by the hardpan at a depth of 25 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used for irrigated crops, mainly sugar beets and apricots. Among the other crops grown are cotton and barley. The unit can be used for urban development.

This unit is suited to irrigated crops. It is limited mainly by restricted rooting depth and slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. Ripping and shattering the hardpan increase the effective rooting depth and improve internal drainage.

If this unit is used for urban development, the main limitations are the slow permeability, high shrink-swell potential, depth to the hardpan, risk of seepage, and restricted load supporting capacity. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. The suitability of the soil in this unit for septic tank

absorpt on fields can be improved by ripping the hardpan to increase permeability. If the density of housing is moderate to high, community sewage systems may be needed. Bui dings and roads should be designed to compensate for the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIIs-8 (17), irrigated, and IVs-8 (17), nonirrigated.

167—Deldota clay, partially drained. This very deep, somewhat poorly drained soil is on low alluvial fans. Drainage has been improved through the use of open and tile drains. The so l formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 90 to 300 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown clay about 17 inches thick. The subsoil is yellowish brown clay loam about 7 inches th ck. The upper 15 inches of the substratum is light yellowish brown clay loam, and the lower part to a depth of 60 inches or more is yellowish brown clay loam that has mottles along root channels. This soil is calcareous below a depth of 17 inches, and it has excess lime between depths of 24 and 39 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 2 inches at the surface. In some areas the surface layer is clay loam.

Included in this un t is about 10 percent Chateau clay, partially drained; Dosamigos clay, partially drained; and Dosamigos clay loam, partially drained, adjacent to the lower lying areas. Also included are small areas of Woo clay, 0 to 2 percent slopes; Woo clay oam, 0 to 2 percent slopes; Paver clay loam, 0 to 2 percent slopes and Stanislaus clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Deldota soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal h gh water table is at a depth of 42 to 60 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated crops, mainly tomatoes, oat hay, alfalfa, cotton, sugar beets, cantaloup, and corn. Among the other crops grown are almonds. Some areas are used for homesite development.

Th s unit is suited to irrigated crops. t is limited mainly by the slow permeability, the clay texture of the surface layer, and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for homesite development, the main limitations are the slow permeabi ity, wetness, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIw-5 (17), irrigated, and IVw-5 (17), nonirrigated.

168—Dosamigos clay loam, partially drained. This very deep, somewhat poorly drained soil is on low alluvial fans adjacent to the valley basin rim. Drainage has been improved through the use of underground drains. The soil formed in m xed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 70 to 130 feet. The average

annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 5 inches of the surface layer is brown clay loam and the lower 9 inches is brown clay. The subsoil is brown, light yellowish brown, and yellowish brown clay about 15 inches thick. It has dark brown and black mottles in the upper part. The upper 23 inches of the substratum is light yellowish brown and yellow clay loam, and the lower part to a depth of 60 inches or more is brownish yellow clay. This soil is calcareous below a depth of 5 inches. It is sodic below a depth of 14 inches. In some areas the surface layer is clay.

Included in this unit is about 10 percent Deldota clay, partially drained. Also included are small areas of Volta clay loam, partially drained; Pedcat clay loam, leveled, 0 to 2 percent slopes; and Volta clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dosamigos soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated crops, mainly alfalfa, oat hay, sugar beets, and corn, and for pasture. Among the other crops grown are barley and cotton. Some areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by wetness, excess salts and sodium, and very slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the very slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies. Content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are the very slow permeability, wetness, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the very slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability unit IIIw-6 (17), irrigated, and capability subclass VIw (17), nonirrigated.

169—Dosamigos clay, partially drained. This very deep, somewhat poorly drained soil is on low alluvial fans adjacent to the valley basin rim. Drainage has been improved through the use of underground drains. The soil formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 90 to 180 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown clay about 15 inches thick. It has small pieces of hard lime

and is calcareous in the lower part. The upper 5 inches of the subsoil is dark grayish brown clay, and the lower 7 inches is olive brown and dark grayish brown clay. The subsoil has masses of gypsum and is calcareous. The upper 7 inches of the substratum is calcareous, light olive brown clay loam, and the lower part to a depth of 60 inches or more is calcareous, yellowish brown and olive yellow clay loam. This soil is saline below a depth of 15 inches. In some areas the surface layer is clay loam.

Included in this unit is about 10 percent Deldota clay, partially drained. Also included are small areas of Woo clay, 0 to 2 percent slopes; Chateau clay, partially drained; Woo clay loam, 0 to 2 percent slopes; and Britto clay loam, leveled. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dosamigos soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used for irrigated crops, mainly cotton, sugar beets, cantaloup, alfalfa, and corn. Some areas are used for pasture.

This unit is suited to irrigated crops. It is limited mainly by wetness, excess salts, the clay texture of the surface layer, and very slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This map unit is in capability unit IIIw-6 (17), irrigated, and capability subclass VIw (17), nonirrigated.

170—Dospalos clay loam, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 115 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 24 inches of the surface layer is dark gray clay loam that has light gray, white, and light brownish gray mottles, and the lower 3 inches is gray clay that has white mottles. The subsoil is pale olive clay about 10 inches thick. It has light olive brown mottles. The upper 17 inches of the substratum is light yellowish brown clay loam that has brownish yellow mottles, and the lower part to a depth of 60 inches or more is yellowish brown sandy clay loam that has brownish yellow and very dark gray mottles. This soil is calcareous to a depth of 54 inches, and it has excess lime between depths of 24 and 27 inches. In some areas the surface layer is clay.

Included in this unit are small areas of Alros clay loam, partially drained; Bolfar clay loam, partially drained; Elnido sandy loam, partially drained; Palazzo sandy loam, partially drained; and soils that are similar to this Dospalos soil but have a clay surface layer and contain no lime. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dospalos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged

storms in December through February.

Most areas of this unit are used for irrigated crops, mainly cantaloup, field corn, tomatoes, cotton, sugar beets, and alfalfa. Among the other crops grown are barley and sudangrass. Some areas are used for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness and the slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water and the application of water should be regulated so that water does not stand on the surface and damage the crops. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for homesite development, the main limitations are wetness, slow permeability, the risk of ponding, restricted load supporting capacity, and the high shrink-swell potential of the soil. The slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent areas. Plants that tolerate a seasonal high water table and droughtiness should be selected unless drainage and irrigation are provided. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

171—Dospalos clay, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 105 to 115 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is very dark gray clay about 24 inches thick. The lower part is calcareous. The subsoil is calcareous, pale olive clay about 11 inches thick. It has light olive brown mottles. The upper 16 inches of the substratum is calcareous, grayish brown clay loam that has brownish yellow mottles, and the lower part to a depth of 60 inches or more is light yellowish brown sandy clay loam that has brownish yellow mottles. In some areas the surface layer is 10 to 24 inches thick or is clay loam, and in some areas the substratum has excess lime.

Included in this unit are small areas of Alros clay loam, partially drained; Bolfar clay loam, partially drained; Elnido sandy loam, partially drained; Palazzo sandy loam, partially drained; and soils that are similar to this Dospalos soil but contain no lime. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dospalos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this unit from flooding. This unit is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly cotton, sugar beets, alfalfa, and small grain. Among the other crops grown are corn, tomatoes, cantaloup, and sudangrass. Some areas are used for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness, the clay texture of the surface layer and slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water and the application of water should be regulated so that water does not stand on the surface and damage the crops. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

172—Dospalos clay, hummocky. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the unit. The characteristic plant community is mainly beardless wildrye, saltgrass, and soft chess. Elevation is 65 to 75 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray and very dark gray clay about 32 inches thick. The subsoil is calcareous, gray clay loam about 9 inches thick. It has light olive brown mottles. The upper 8 inches of the substratum is calcareous, grayish brown clay loam that has brownish yellow mottles, and the lower part to a depth of 60 inches or more is olive gray clay loam that has brownish yellow mottles. This soil is saline throughout. In some areas the surface layer is 10 to 24 inches thick or is clay loam or silty clay loam.

Included in this unit are small areas of Bolfar clay loam, hummocky; Elnido sandy loam, wet; and Bisgani clay loam, occasionally flooded. Also included are small areas of Agnal clay and Xerofluvents, channeled, which are in sloughs. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Dospalos soil is slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches in December through March. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. Areas along sloughs are used as riparian wildlife habitat. This unit can be used for irrigated crops and as habitat for waterfowl.

The production of forage is limited by low rainfall and the content of salts. Salt-tolerant species should be selected for seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure.

This unit provides habitat for wildlife such as pheasants, doves, and rabbits and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The San Joaquin River and the sloughs in this unit provide important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

If this unit is used for irrigated crops, the main limitations are the hummocky microrelief, wetness, the clay texture of the surface layer, slow permeability, and the content of salts. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Sprinkler irrigation is suited to the soil in this unit. Furrow and border irrigation systems can be used if the soil is leveled. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops.

Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used as habitat for waterfowl, outlets should be provided to regulate the depth of the water. The unit is limited mainly by the content of salts and high shrink-swell potential. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. The high shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability unit IIIw-6 (17), irrigated, and capability subclass VIw (17), nonirrigated.

173—Dospalos-Bolfar complex, occasionally flooded. This map unit is in the valley basin. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the unit. The characteristic plant community is mainly beardless wildrye, saltgrass, and soft chess. Elevation is 60 to 70 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 40 percent Dospalos clay and 40 percent Bolfar clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 15 percent Agnal clay loam; Bisgani clay loam, occasionally flooded; Bisgani sandy loam, partially drained; and Elnido sandy loam, partially drained. Also included are small areas of Xerofluvents, channeled, in channels. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Dospalos soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is dark gray and very dark gray clay about 32 inches thick. The subsoil is calcareous, gray clay loam about 9 inches thick. It has light olive brown mottles. The upper 8 inches of the substratum is calcareous, grayish brown clay loam that has brownish yellow mottles, and the lower part to a depth of 60 inches or more is olive gray clay loam that has brownish yellow mottles. This soil is saline throughout. In some areas the surface layer is clay loam or silty clay loam.

Permeability of the Dospalos soil is slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches in December through March. This soil is subject to occasional, long periods of flooding in January through March; flooding is from the San Joaquin River and the sloughs in the unit. This soil is subject to brief periods of ponding after prolonged storms in December through March.

The Bolfar soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is calcareous, mottled, grayish brown and dark gray clay loam about 26 inches thick. The upper 17 inches of the underlying material is grayish brown sandy loam that has dark yellowish brown mottles, and the lower part to a depth of 60 inches or more is light gray and strong brown loam that has brownish yellow mottles. In some areas the surface layer is loam.

Permeability of the Bolfar soil is moderately slow to a depth of 26 inches and moderate below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches in December through March. This soil is subject to occasional, long periods of flooding in January through March; flooding is from the San Joaquin River and the sloughs in the unit. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. Areas adjacent to sloughs are used as riparian wildlife habitat. This unit can be used for irrigated crops and as habitat for waterfowl.

The production of forage on this unit is limited by low rainfall, occasional flooding, and the content of salts in the Dospalos soil. Salt-tolerant species should be selected for seeding. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock operations are impaired by occasional periods of flooding in January through March.

This unit provides habitat for wildlife such as pheasants, doves, and rabbits and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The San Joaquin River and the sloughs in this unit provide

important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

If this unit is used for irrigated crops, the main limitations are the occasional periods of flooding, hummocky microrelief, and wetness. The Dospalos soil is also limited by the content of salts and slow permeability. Flooding can be controlled only by use of major flood control structures. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Sprinkler irrigation is suited to this unit, and furrow and border irrigation systems can be used if the soils in the unit are leveled. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used as habitat for waterfowl, outlets should be provided to regulate the depth of water. The unit is limited mainly by the content of salts in the Dospalos soil and the moderate to high shrink-swell potential of the soils. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soils. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability unit IIIw-6 (17), irrigated, and capability subclass VIw (17), nonirrigated.

174—Dospalos-Urban land complex, partially drained. This map unit is in the valley basin. Drainage has been improved through the use of open drains. Slope is 0 to 2 percent. Elevation is 110 to 115 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 45 percent Dospalos clay and 35 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Dospalos clay loam, partially drained; Elnido clay loam, partially drained; Elnido sandy loam, partially drained; and Wekoda clay, partially drained. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Dospalos soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is very dark gray clay about 24 inches thick. It is calcareous in the lower part. The subsoil is calcareous, pale olive clay about 11 inches thick. It has light olive brown mottles. The upper 16 inches of the substratum is calcareous, grayish brown clay loam that has brownish yellow mottles, and the lower part to a depth of 60 inches or more is light yellowish brown sandy clay loam that has brownish yellow mottles. In some areas the surface layer is clay loam.

Permeability of the Dospalos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding in December through March.

Urban land consists of areas covered by streets, parking lots, and buildings.

This unit is used for urban development, including buildings, yards, parks, playgrounds, streets, and parking lots.

If this unit is used for windbreaks and environmental plantings, the main limitations are wetness and the clayey texture of the Dospalos soil. Supplemental irrigation may be needed when planting and during dry periods.

If this unit is used for recreational development, the main limitation is the clayey texture of the Dospalos soil.

If the Dospalos soil is used for urban development, the main limitations are the restricted load supporting capacity, slow permeability, wetness, and high shrink-

swell potential. Drainage is needed for best results with most lawn grasses, shade trees, ornamental trees, shrubs and vines and with vegetable gardens. Selection of adapted vegetation is critical. Buildings and roads should be designed to offset the limited ability of the soil to support a load. The slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If this soil is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIw-2 (17), irrigated and IVw-2 (17), nonirrigated.

175—Edminster loam. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the area. The characteristic plant community is mainly saltgrass and soft chess. Elevation is 70 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is gray loam about 4 inches thick. The upper 5 inches of the subsoil is gray and olive clay loam, and the lower 17 inches is olive gray and grayish brown clay loam that has dark gray and light gray mottles. The upper 13 inches of the substratum is grayish brown and light brownish gray clay loam, and the lower part to a depth of 60 inches or more is pale yellow and light olive gray clay loam over loam that has olive yellow and brownish yellow mottles. This soil is calcareous below a depth of 4 inches. It is saline-sodic in the subsoil and saline in the substratum. In some areas the surface layer is sandy loam, fine sandy loam, or clay loam, and in some areas the subsoil is clay.

Included in this unit are about 10 percent Kesterson sandy loam and small areas of Turlock sandy loam and Kesterson sandy loam, ponded, in the wetter areas. Also included are small areas of Checker loam and Edminster Variant sand in the higher lying areas, and Xerofluvents, channeled, in channels. Included areas make up about 35 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Edminster soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through April. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. Areas adjacent to sloughs are used as riparian wildlife habitat. The unit can be used for irrigated pasture and as habitat for waterfowl.

The production of forage is limited by the excess sodium and salts and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The sloughs in the unit provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

If this unit is used for hay and pasture, the main limitations are the excess salts and sodium, wetness, and hummocky microrelief. Irrigation water can be applied by the border or sprinkler methods. Leveling helps to ensure the uniform application of water. Subsoiling improves water infiltration and allows salts to be leached downward. The concentration of salts and sodium in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper

placement of salt and livestock watering facilities.

If this unit is used as habitat for waterfowl, outlets should be provided to regulate the depth of water. The unit is limited mainly by the excess salts and sodium. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

176—Edminster-Kesterson complex. This map unit is in the valley basin. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the unit. The characteristic plant community is mainly soft chess and saltgrass. Elevation is 70 to 90 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 60 percent Edminster loam and 30 percent Kesterson sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Turlock sandy loam and Kesterson sandy loam, ponded, in the wetter areas; Checker loam in the higher lying areas; and Xerofluvents, channeled, in channels. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Edminster soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is gray loam about 4 inches thick. The upper 5 inches of the subsoil is gray and olive clay loam, and the lower 17 inches is olive gray and grayish brown clay loam that has dark gray and light gray mottles. The upper 13 inches of the substratum is grayish brown and light brownish gray clay loam, and the lower part to a depth of 60 inches or more is pale yellow and light olive gray clay loam over loam that has olive yellow and brownish yellow mottles. This soil is calcareous below a depth of 4 inches. The subsoil is saline-sodic, and the substratum is saline. In some areas the surface layer is fine sandy loam, sandy loam, or clay loam, and in some areas the subsoil is clay.

Permeability of the Edminster soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through April. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

The Kesterson soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is dark grayish brown sandy loam about 1.5 inches thick. The subsurface layer is gray and dark gray loam about 1.5 inches thick. The subsoil is gray, olive gray, and light brownish gray clay loam about 23 inches thick. It has brownish yellow and very dark gray mottles. The upper 20 inches of the substratum is light brownish gray and light gray clay loam that has yellowish brown mottles, and the lower part to a depth of 60 inches or more is pale olive loam that has yellowish brown mottles. This soil is calcareous below a depth of 3 inches, and it has excess lime below a depth of 26 inches. It is sodic below a depth of 3 inches. In some areas the surface layer is loam, clay loam, or fine sandy loam.

Permeability of the Kesterson soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more, but it is restricted by excess lime at a depth of about 24 to 33 inches. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through April. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. Areas adjacent to sloughs are used as riparian wildlife habitat. This unit can be used for irrigated pasture and as habitat for waterfowl.

The production of forage on this unit is limited by the excess salts in the Edminster soil, excess sodium, and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits

and doves and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. Sloughs provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

If this unit is used for hay and pasture, the main limitations are the excess sodium, wetness, and hummocky microrelief. The Kesterson soil is also limited by the content of lime, and the Edminster soil is limited by excess salts. Irrigation water can be applied by the border or sprinkler methods. Leveling helps to ensure the uniform application of water. Where the substratum of the Kesterson soil is exposed by leveling, the content of lime can cause iron chlorosis in some crops. Adding iron supplements can correct this condition. Subsoiling improves water infiltration and allows salts to be leached downward. The concentration of salts and sodium limits the production of plants suitable for hay and pasture. Leaching the salts is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soils in this unit. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used as habitat for waterfowl, outlets should be provided to regulate the depth of the water. The unit is limited mainly by the excess salts and sodium. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soils. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

177—Edminster Variant sand. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the unit. The characteristic plant community is mainly saltgrass, iodinebush, alkali heath, and soft chess. Elevation is 70 to 80 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown sand about 16 inches thick. The underlying material, to a depth of 25 inches, is light yellowish brown sand. Below this is a buried subsoil. The upper 6 inches is yellowish brown sandy loam that has light gray mottles, and the lower part to a depth of 60 inches or more is very pale brown silt loam that has very dark gray and yellow mottles. This soil is calcareous below a depth of 41 inches. In some areas the surface layer is loamy sand.

Included in this unit are small areas of Edminster loam and Kesterson sandy loam and about 10 percent soils that are similar to this Edminster Variant soil but are sandy loam in the surface layer and underlying material. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Edminster Variant soil is rapid to a depth of 25 inches and moderately slow below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. Soil blowing is a hazard when the surface is left dry and barren. A seasonal high water table is at a depth of 36 to 60 inches in December through March. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through February.

This unit is used mainly as rangeland. Areas adjacent to sloughs are used as riparian wildlife habitat.

The production of forage is limited by low rainfall and droughtiness of the surface layer. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of sufficient cover and water. The sloughs in this unit provide

important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IIIw-4 (17), irrigated, and capability subclass VIw (17), nonirrigated.

178—Elnido sandy loam, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 80 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown sandy loam about 18 inches thick. It has dark yellowish brown mottles in the lower part when moist. The subsoil is grayish brown sandy loam about 9 inches thick. It has brown mottles when moist. The substratum to a depth of 60 inches or more is grayish brown sandy loam that has brown mottles when moist. In some areas the surface layer is loam or silt loam.

Included in this unit is about 10 percent Elnido clay loam, partially drained. Also included are small areas of Bisgani loamy sand, partially drained; Palazzo sandy loam, partially drained; Bolfar clay loam, partially drained; and Dospalos clay loam, partially drained. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Elnido soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly alfalfa, cotton, sugar beets, and corn. Among the other crops grown are barley, tomatoes, cantaloup, and walnuts. The unit is also used for pasture. Some areas are used for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, water should be applied at frequent intervals and runs should be short. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are wetness, the risk of seepage, and the periods of ponding. If drainage outlets are available, tile drains can be placed around the perimeter of septic tank absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. If the density of housing is moderate to high, community sewage systems may be needed. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent areas.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

179—Elnido sandy loam, wet. This very deep, poorly drained soil is in higher lying, ponded areas in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

The microrelief is hummocky. The characteristic plant community is mainly saltgrass, barley, and alkali sacaton. Elevation is 75 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown and dark gray sandy loam about 8 inches thick. It has dark yellowish brown mottles. The upper 24 inches of the underlying material is light brownish gray and grayish brown sandy loam, and the lower part to a depth of 60 inches or more is grayish brown loamy sand that has yellowish brown mottles. In some areas the profile is slightly acid.

Included in this unit are small areas of Bolfar clay loam, hummocky, and Dospalos clay, hummocky. Also included are areas of Xerofluvents, channeled, in depressional areas; Bisgani loamy sand, partially drained, in old oxbows; and Turlock sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Elnido soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 42 inches in October through March. This unit is subject to brief periods of ponding after prolonged storms in December through February.

This unit is used as wildlife habitat, mainly for waterfowl. It is also used as rangeland.

The production of forage is limited by low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The sloughs and creeks in this unit provide important habitat elements such as food, water, and cover in areas otherwise dominated by grasses and forbs.

This map unit is in capability units IIIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

180—Elnido clay loam, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. This soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray and grayish brown clay loam about 17 inches thick. It has dark brown mottles. The subsoil is grayish brown sandy loam about 10 inches thick. It has dark brown mottles. The upper 17 inches of the substratum is pale brown sandy loam, and the lower part to a depth of 60 inches or more is light gray sand. In some areas the surface layer is loam or silt loam.

Included in this unit are small areas of Bolfar clay loam, partially drained; Dospalos clay loam, partially drained; Elnido sandy loam, partially drained; Bisgani loamy sand, partially drained; and Palazzo sandy loam, partially drained. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Elnido soil is moderately slow over moderately rapid. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly alfalfa, cotton, sugar beets, and corn. Among the other crops grown are barley, tomatoes, cantaloup, and walnuts. The unit is also used for pasture. Some areas are used for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be

used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are wetness, the risk of seepage, the periods of ponding, restricted load supporting capacity, and moderate shrink-swell potential. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. If the density of housing is moderate to high, community sewage systems may be needed. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent areas. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This unit provides habitat for wildlife such as doves and pheasants. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

181—Escano clay loam, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray and very dark gray clay loam about 17 inches thick. The subsoil is olive gray and pale olive clay loam about 5 inches thick. It has light gray mottles. The upper 7 inches of the substratum is olive clay loam that has light gray mottles, the next 22 inches is white and pale olive clay loam, and the lower part to a depth of 60 inches or more is pale olive and white loam. This soil is calcareous below a depth of 10 inches, and it has excess lime below a depth of 29 inches. In some areas the surface layer is loam or sandy clay loam.

Included in this unit are small areas of Bolfar clay loam, partially drained; Alros clay loam; Dospalos clay loam, partially drained; and Elnido clay loam, partially drained. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Escano soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more, but it is restricted by excess lime at a depth of about 25 to 39 inches. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect the soil from flooding. This unit is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly cotton, alfalfa, sugar beets, field corn, barley, and tomatoes. Among the other crops grown is cantaloup. Some areas are used for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness and the excess lime in the lower part of the substratum. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. The excess lime in the lower part of the substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water

should be disposed of properly to maintain the quality of water supplies.

If this unit is used for homesite development, the main limitations are wetness, moderately slow permeability, periods of ponding, restricted load supporting capacity, and moderate shrink-swell potential. The moderately slow permeability and the high water table increase the possibility of failure of septic tank absorption fields. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent areas. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

182—Fifield sandy loam, 50 to 65 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from sedimentary or metamorphic rock. The characteristic plant community is mainly blue oak, soft chess, and wild oat with a total tree canopy of 30 to 50 percent. Elevation is 1,000 to 2,400 feet. The average annual precipitation is about 14 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

Typically, the surface layer is brown sandy loam about 5 inches thick. It is 10 percent gravel. The subsoil is yellowish brown very gravelly loam about 10 inches thick. It is 40 percent gravel. The substratum is yellowish brown over light yellowish brown extremely gravelly loam about 15 inches thick. It is 75 percent angular gravel. Slightly weathered, fractured sandstone is at a depth of 30 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to sedimentary or metamorphic rock ranges from 20 to 35 inches.

Included in this unit are small areas of Quinto gravelly sandy loam, 40 to 75 percent slopes; Millsholm loam, 40 to 75 percent slopes; Fifield sandy loam, 30 to 50 percent slopes; Rock outcrop; and soils that are similar to this Fifield soil but have an average annual soil temperature of less than 59 degrees F. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Fifield soil is moderate. Available water capacity is very low to low; however, the trees on this soil can extract water from the underlying fractured rock. Effective rooting depth is limited by sedimentary or metamorphic rock at a depth of 20 to 35 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage is limited by very low to low available water capacity and slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. The steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope Grazing should be delayed until the soil is firm enough to withstand trampling by livestock and the more desirable forage plants have had an opportunity to set seed. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering facilities and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 22 cords of wood per acre in a stand of trees that average 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

183—Fifield-Gonzaga complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Fifield soil is mainly blue oak, soft chess, and wild oat with a total tree canopy of 30 to 50 percent, and on the Gonzaga soil it is mainly soft chess, wild oat, and blue oak with a total tree canopy of 15 to 25 percent. Elevation is 500 to 3,000 feet. The average annual precipitation is about 13 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 60 percent Fifield sandy loam and 25 percent Gonzaga loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Fifield sandy loam, 50 to 65 percent slopes; Gonzaga loam, 50 to 65 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Franciscan sandy loam, 30 to 50 percent slopes; Rock outcrop; and soils that are similar to this Fifield soil but have an average annual soil temperature of less than 59 degrees F. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Fifield soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary or metamorphic rock. Typically, the surface layer is brown sandy loam about 5 inches thick. It is 10 percent gravel. The subsoil is yellowish brown very gravelly loam about 10 inches thick. It is 40 percent gravel. The substratum is yellowish brown over light yellowish brown extremely gravelly loam about 15 inches thick. It is 75 percent angular gravel. Slightly weathered, fractured sandstone is at a depth of 30 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to sedimentary or metamorphic rock ranges from 20 to 35 inches.

Permeability of the Fifield soil is moderate. Available water capacity is very low to low; however, trees can extract water from the underlying fractured rock. Effective rooting depth is limited by the sedimentary or metamorphic rock at a depth of 20 to 35 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Gonzaga soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the upper 16 inches of the surface layer is yellowish brown loam that is 10 percent gravel and the lower 6 inches is brown gravelly sandy clay loam that is 25 percent gravel and cobbles. The subsoil is yellowish red and strong brown gravelly sandy clay about 17 inches thick. It is 20 to 25 percent angular gravel. Slightly weathered, strongly fractured siltstone is at a depth of 39 inches. Some soil material is in the fractures. Unweathered, strongly fractured siltstone is at a depth of 43 inches. In some areas the surface layer is sandy clay loam or clay loam. Depth to slightly weathered sedimentary or metamorphic rock ranges from 20 to 40 inches.

Permeability of the Gonzaga soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 12 to 24 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as wildlife habitat. It is also used as rangeland. It can be used for firewood production.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The production of forage is limited by slope and by the very low to low available water capacity of the Fifield soil. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage

plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 22 cords of wood per acre in a stand of trees that average 8 to 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

184—Fifield-Honker-Gonzaga complex, 50 to 65 percent slopes. This map unit is on mountains (fig. 4). The characteristic plant community on the Fifield soil is mainly blue oak, soft chess, and wild oat with a total tree canopy of 30 to 50 percent; on the Honker soil it is mainly wild oat and soft chess; and on the Gonzaga soil it is mainly soft chess, wild oat, and blue oak with a total tree canopy of 15 to 25 percent. Elevation is 700 to 1,800 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 40 percent Fifield sandy loam, 25 percent Honker loam, and 20 percent Gonzaga loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Fifield sandy loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Gonzaga loam, 30 to 50 percent slopes; Franciscan sandy loam, 50 to 65 percent slopes; Millsholm loam, 40 to 75 percent slopes; Rock outcrop; and soils that are similar to this Fifield soil but have an average annual soil temperature of less than 59 degrees F. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Fifield soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary or metamorphic rock. Typically, the surface layer is brown sandy loam about 5 inches thick. It is 10 percent gravel. The subsoil is yellowish brown very gravelly loam about 10 inches thick. It is 40 percent gravel. The substratum is yellowish brown over light yellowish brown extremely gravelly loam about 15 inches thick. It is 75 percent angular gravel. Slightly weathered, fractured sandstone is at a depth of 30 inches. Depth to sedimentary or metamorphic rock ranges from 20 to 35 inches. In some areas the surface layer is loam or gravelly sandy loam.

Permeability of the Fifield soil is moderate. Available water capacity is very low to low; however, trees can extract water from the underlying fractured rock. Effective rooting depth is limited by sedimentary or metamorphic rock at a depth of 20 to 35 inches. Runoff is rapid, and the hazard of water erosion is high.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam. Depth to sedimentary rock ranges from 20 to 40 inches.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is high.

The Gonzaga soil is moderately deep and well drained. It formed in residuum derived dominantly from sedimentary and metamorphic rock. Typically, the upper 16 inches of the surface layer is yellowish brown loam that is 10 percent gravel and the lower 6 inches is brown gravelly sandy clay loam that is 25 percent gravel and cobbles. The subsoil is yellowish red and strong brown gravelly sandy clay about 17 inches thick. It is 20 to 25 percent angular gravel. Slightly weathered, strongly fractured siltstone is at a depth of 39 inches. Some soil material is in the fractures. Unweathered, strongly fractured siltstone is at a depth of 43 inches. Depth to slightly weathered sedimentary or metamorphic rock ranges from 20 to 40 inches. In some areas the surface layer is sandy clay loam or clay loam.

Permeability of the Gonzaga soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by

Figure 4.—Area of Fifield-Honker-Gonzaga complex, 50 to 65 percent slopes, near Pacheco Pass.

the content of clay at a depth of 12 to 24 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage is limited by slope and by the very low to low available water capacity of the Fifield soil. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope.

Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 19 cords of wood per acre in a stand of trees that average 8 to 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

185—Fifield-Millsholm complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Fifield soil is mainly blue oak, soft chess, and wild oat with a total tree canopy of 30 to 50 percent, and on the Millsholm soil it is mainly soft chess, filaree, and foxtail fescue. Elevation is 700 to 2,200 feet. The average annual precipitation is about 13 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 55 percent Fifield sandy loam and 30 percent Millsholm loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Gonzaga loam, 30 to 50 percent slopes; Franciscan sandy loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Fifield sandy loam, 50 to 65 percent slopes; Millsholm loam, 50 to 65 percent slopes; and soils that are similar to this Fifield soil but have an average annual soil temperature of less than 59 degrees F. Also included are small areas of soils that are similar to the Fifield and Millsholm soils but have slopes of 15 to 30 percent; these soils are between San Luis Creek and Spicer Creek. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Fifield soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the surface layer is brown sandy loam about 5 inches thick. It is 10 percent gravel. The subsoil is yellowish brown very gravelly loam about 10 inches thick. It is 40 percent gravel. The substratum is yellowish brown over light yellowish brown extremely gravelly loam about 15 inches thick. It is 75 percent angular gravel. Slightly weathered, fractured sandstone is at a depth of 30 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to sedimentary or metamorphic rock ranges from 20 to 35 inches.

Permeability of the Fifield soil is moderate. Available water capacity is very low to low; however, trees can extract water from the underlying fractured rock. Effective rooting depth is limited by sedimentary or metamorphic rock at a depth of 20 to 35 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. Depth to sandstone or shale ranges from 15 to 20 inches. In some areas the surface layer is sandy loam.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 15 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by the very low to low available water capacity of the soils and steepness of slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface

reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 22 cords of wood per acre in a stand of trees that average 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

186—Fluvaquents, channeled. These very deep, very poorly drained soils are in river and stream channels and on lake bottoms. The soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The native vegetation in areas not inundated is mainly grasses, forbs, shrubs, and trees. Elevation is 50 to 170 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

No single profile is typical of these soils, but one commonly observed in the survey area has a surface layer that is light gray and light brownish gray loamy coarse sand about 10 inches thick. It has yellow mottles. The upper 15 inches of the underlying material is gray loamy sand, and the lower part to a depth of 60 inches or more is gray loamy coarse sand. The texture, color, and thickness of these soils vary widely within a short distance and from one area to another.

Included in this unit is about 10 percent Xerofluvents, channeled.

Permeability of these Fluvaquents, channeled, is moderately slow to rapid. Available water capacity is low to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion generally is slight, but it is high during periods of flooding. These soils are subject to frequent periods of flooding throughout the year.

This unit is used as wildlife habitat and recreation areas.

This unit is used by a variety of wildlife, including raptors, shore birds, waterfowl, upland game birds, and fur-bearing mammals. Care should be taken not to harm the existing wildlife habitat when planning new recreational facilities.

This map unit is in capability subclass VIIIw (17), nonirrigated.

187—Franciscan sandy loam, 50 to 70 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from sedimentary and metamorphic rock. The characteristic plant community is mainly blue oak, soft chess, and ripgut brome with a total tree canopy of 35 to 50 percent. Elevation is 500 to 3,600 feet. The average annual precipitation is about 13 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

Typically, the surface layer is grayish brown and brown sandy loam about 10 inches thick. It is 10 percent gravel. The upper 16 inches of the subsoil is brown sandy clay loam, and the lower 8 inches is brown gravelly sandy clay loam that is 30 percent gravel. The substratum is strong brown and light yellowish brown gravelly sandy clay loam about 4 inches thick. It is 30 percent angular gravel. Fractured sandstone and metamorphic rock are at a depth of 38 inches. In some areas the surface layer is loam or sandy clay loam, and in some areas the subsoil is sandy loam. Depth to sedimentary and metamorphic rock ranges from 20 to 40 inches.

Included in this unit is about 10 percent soils that are similar to this Franciscan soil but are deep, are clayey throughout, and develop wide cracks upon drying; these soils are mainly in the Quinto Creek area. Also included are small areas of Rock outcrop; Franciscan sandy loam, 30 to 50 percent slopes; Fifield sandy loam, 50 to 65 percent slopes; Gonzaga loam, 50 to 65 percent slopes; and Quinto gravelly sandy loam, 40 to 75

percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Franciscan soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sedimentary or metamorphic rock at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope. If trees and shrubs are managed to create open areas, the soil in this unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Grazing should be delayed until the soil is firm enough to withstand trampling by livestock and the more desirable forage plants have had an opportunity to set seed. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 14 cords of wood per acre in a stand of trees that average 8 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

188—Franciscan-Quinto-Honker complex, 50 to 75 percent slopes. This map unit is on mountains. The characteristic plant community on the Franciscan soil is mainly blue oak, soft chess, and ripgut brome with a total tree canopy of 35 to 50 percent; on the Quinto soil it is mainly California buckwheat, soft chess, and red brome; and on the Honker soil it is mainly wild oat and soft chess. Elevation is 500 to 2,400 feet. The average annual precipitation is about 13 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 40 percent Franciscan sandy loam, 25 percent Quinto gravelly sandy loam, and 20 percent Honker sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Franciscan sandy loam, 30 to 50 percent slopes; Fifield sandy loam, 50 to 65 percent slopes; Gonzaga loam, 50 to 65 percent slopes; Millsholm loam, 40 to 75 percent slopes; and Quinto gravelly sandy loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Franciscan soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the surface layer is grayish brown and brown sandy loam about 10 inches thick. It is 10 percent gravel. The upper 16 inches of the subsoil is brown sandy clay loam, and the lower 8 inches is brown gravelly sandy clay loam that is 30 percent gravel. The substratum is strong brown and light yellowish brown gravelly sandy clay loam about 4 inches thick. It is 30 percent angular gravel. Fractured sandstone and metamorphic rock are at a depth of 38 inches. Depth to sedimentary and metamorphic rock ranges from 20 to 40 inches. In some areas the surface layer is loam or sandy clay loam.

Permeability of the Franciscan soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sedimentary and metamorphic rock at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Quinto soil is shallow and somewhat excessively drained. It formed in material derived dominantly from sandstone conglomerate. Typically, the surface layer is yellowish brown gravelly sandy loam about 6 inches thick. It is 15 percent gravel. The subsoil is brown

gravelly sandy clay loam about 11 inches thick. It is 15 percent gravel. Sandstone conglomerate is at a depth of 17 inches. Depth to sandstone conglomerate or fractured sandstone ranges from 10 to 20 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is sandy loam.

Permeability of the Quinto soil is moderately slow. Available water capacity is very low. Effective rooting depth is limited by sandstone conglomerate or fractured sandstone at a depth of 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very high.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. Depth to sedimentary rock ranges from 20 to 40 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope and the hazard of erosion and by the very low available water capacity and eroded surface layer of the Quinto soil. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, wild pigs, and quail. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering facilities and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 14 cords of wood per acre in a stand of trees that average 8 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

189—Franciscan-Rock outcrop complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community is mainly blue oak, soft chess, and ripgut brome with a total tree canopy of 35 to 50 percent. Elevation is 1,200 to 2,600 feet. The average annual precipitation is about 14 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 40 percent Franciscan sandy loam and 30 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 15 percent soils that are similar to the Franciscan soil but have basic igneous rock at a depth of 20 to 40 inches; these soils are south of Sweeney Hill Road and west of the South Fork of Los Banos Creek. Also included are small areas of Franciscan sandy loam, 50 to 70 percent slopes; Quinto gravelly sandy loam, 30 to 50 percent slopes; Millsholm loam, 30 to 50 percent slopes; Tunehill loam, 30 to 50

percent slopes; Quiensabe sandy clay loam, 30 to 50 percent slopes; and Quiensabe clay loam, 30 to 50 percent slopes. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Franciscan soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the surface layer is grayish brown and brown sandy loam about 10 inches thick. It is 10 percent gravel. The upper 16 inches of the subsoil is brown sandy clay loam, and the lower 8 inches is brown gravelly sandy clay loam that is 30 percent gravel. The substratum is strong brown and light yellowish brown gravelly sandy clay loam about 4 inches thick. It is 30 percent angular gravel. Fractured sandstone and metamorphic rock are at a depth of 38 inches. Depth to sedimentary or metamorphic rock ranges from 20 to 40 inches. In some areas the surface layer is loam or sandy clay loam, and in some areas the subsoil is sandy loam.

Permeability of the Franciscan soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sedimentary and metamorphic rock at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

Rock outcrop consists mainly of exposed areas of sedimentary, metamorphic, or basic igneous rock; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope and the areas of Rock outcrop. If trees and shrubs are managed to create open areas, the Franciscan soil can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope and the areas of Rock outcrop. Steepness of slope and the areas of Rock outcrop limit the use of equipment. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 14 cords of wood per acre in a stand of trees that average 8 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

190—Gonzaga-Honker complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Gonzaga soil is mainly soft chess, wild oat, and blue oak with a total tree canopy of 15 to 25 percent, and on the Honker soil it is mainly wild oat and soft chess. Elevation is 500 to 1,800 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 60 percent Gonzaga loam and 25 percent Honker sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Gonzaga loam, 50 to 65 percent slopes; Honker sandy loam, 50 to 65 percent slopes; Contra Costa loam, 30 to 50 percent slopes; Franciscan sandy loam, 30 to 50 percent slopes; and Millsholm loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Gonzaga soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the upper 16 inches of the surface layer is yellowish brown loam

that is 10 percent gravel and the lower 6 inches is brown gravelly sandy clay loam that is 25 percent gravel and cobbles. The subsoil is yellowish red and strong brown gravelly sandy clay about 17 inches thick. It is 20 to 25 percent angular gravel. Slightly weathered, strongly fractured siltstone is at a depth of 39 inches. Some soil material is in the fractures. Unweathered, strongly fractured siltstone is at a depth of 43 inches. Depth to slightly weathered sedimentary or metamorphic rock ranges from 20 to 40 inches. In some areas the surface layer is sandy clay loam or clay loam.

Permeability of the Gonzaga soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 12 to 24 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam. Depth to sedimentary rock ranges from 20 to 40 inches.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 20 cords of wood per acre in a stand of trees that average 8 to 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIe (15), nonirrigated.

191—Gonzaga-Honker complex, 50 to 65 percent slopes. This map unit is on mountains. The characteristic plant community on the Gonzaga soil is mainly soft chess, wild oat, and blue oak with a total tree canopy of 15 to 25 percent, and on the Honker soil it is mainly wild oat and soft chess. Elevation is 600 to 1,800 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 60 percent Gonzaga loam and 25 percent Honker sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Gonzaga loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Franciscan sandy loam, 50 to 70 percent slopes; Contra Costa loam, 50 to 65 percent slopes; and Millsholm loam, 40 to 75 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Gonzaga soil is moderately deep and well

drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the upper 16 inches of the surface layer is yellowish brown loam that is 10 percent gravel and the lower 6 inches is brown gravelly sandy clay loam that is 25 percent gravel and cobbles. The subsoil is yellowish red and strong brown gravelly sandy clay about 17 inches thick. It is 20 to 25 percent angular gravel. Slightly weathered, strongly fractured siltstone is at a depth of 39 inches. Some soil material is in the fractures. Unweathered, strongly fractured siltstone is at a depth of 43 inches. Depth to slightly weathered sedimentary or metamorphic rock ranges from 20 to 40 inches. In some areas the surface layer is sandy clay loam or clay loam.

Permeability of the Gonzaga soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 12 to 24 inches. Runoff is rapid, and the hazard of water erosion is high.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. Depth to sedimentary rock ranges from 20 to 40 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as wildlife habitat. It is also used as rangeland. It can be used for firewood production.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The production of forage is limited by slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 20 cords of wood per acre in a stand of trees that average 8 to 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

192—Henmel clay loam, partially drained. This very deep, poorly drained soil is on low alluvial fans adjacent to the valley basin rim. Drainage has been altered through the use of underground and open drains. The soil formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 95 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown clay loam about 15 inches thick. It has gray and dark yellowish brown mottles in the lower part. The upper 22 inches of the subsoil is grayish brown silty clay loam over silty clay that has gray and dark yellowish brown mottles, and the lower 7 inches is dark grayish brown sandy clay that has gray mottles. The substratum to a depth of 60 inches or more is dark brown sandy loam

that has dark yellowish brown and olive gray mottles. This soil is calcareous below a depth of 37 inches. In some areas the surface layer is silty clay loam, and in some areas the substratum is clay loam.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes; Stanislaus clay loam; Capay clay loam; Pedcat clay loam, leveled, 0 to 2 percent slopes; and Turlock loam, leveled. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Henmel soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 60 inches in December through March.

Most areas of this unit are used for irrigated crops, mainly cotton, alfalfa, and barley. It is also used for irrigated pasture. Some areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by slow permeability and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are the slow permeability, wetness, the risk of seepage, restricted load supporting capacity, and moderate to high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. If the density of housing is moderate to high, community sewage systems may be needed. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIw-3 (17), irrigated, and IVw-3 (17), nonirrigated.

193—Herito loam. This very deep, well drained soil is on terraces. It formed in mixed alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess, filaree, and clover. Slope is 0 to 2 percent. Elevation is 250 to 500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown loam about 10 inches thick. The subsurface layer is light brown loam about 2 inches thick. The upper 16 inches of the subsoil is brown over strong brown clay loam, and the lower 15 inches is calcareous, brown clay loam. The substratum to a depth of 60 inches or more is strong brown clay loam. In some areas the surface layer is gravelly loam, silty clay loam, or sandy loam.

Included in this unit are small areas of soils that are similar to this Herito soil but are underlain by sandstone at a depth of 20 to 40 inches; Anela very gravelly sandy loam, 2 to 8 percent slopes; Arburua loam, 15 to 30 percent slopes; Carranza gravelly clay loam, 2 to 8 percent slopes; Oquin fine sandy loam, 2 to 8 percent slopes; Ayar clay, 2 to 8 percent slopes; and Ayar clay, 8 to 15 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Herito soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the

hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVs-3 (17), nonirrigated.

194—Honker sandy loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from sedimentary rock. The characteristic plant community is mainly wild oat and soft chess (fig. 5). Elevation is 1,400 to 1,900 feet. The average annual precipitation is about 15 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 230 days.

Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. Depth to sedimentary rock ranges from 20 to 40 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam.

Included in this unit are small areas of Rock outcrop; Honker sandy loam, 50 to 65 percent slopes; Millsholm loam, 30 to 50 percent slopes; Contra Costa loam, 30 to 50 percent slopes; and soils that are similar to this Honker soil but are 10 to 20 inches deep to bedrock. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as wildlife habitat. It is also used as rangeland.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The production of forage on this unit is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIe (15), nonirrigated.

195—Honker sandy loam, 50 to 65 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from sedimentary rock. The characteristic plant community is mainly wild oat and soft chess. Elevation is 500 to 2,000 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong

Figure 5.—Area of Honker sandy loam, 30 to 50 percent slopes, west of Los Banos, that mainly supports annual grasses.

brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam. Depth to sedimentary rock ranges from 20 to 40 inches.

Included in this unit are small areas of Rock outcrop; soils that are similar to this Honker soil but are 10 to 20 inches deep to bedrock; Honker sandy loam, 30 to 50 percent slopes; Millsholm loam, 40 to 75 percent slopes; and Contra Costa loam, 50 to 65 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as wildlife habitat. It is also used as rangeland.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The production of forage on this unit is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Grazing should be delayed until the

soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIe (15), nonirrigated.

196—Honker-Millsholm-Rock outcrop complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Honker soil is mainly wild oat and soft chess, and on the Millsholm soil it is mainly filaree, soft chess, and foxtail fescue. Elevation is 500 to 2,400 feet. The average annual precipitation is about 13 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 45 percent Honker sandy loam, 20 percent Millsholm loam, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Contra Costa loam, 30 to 50 percent slopes; Honker sandy loam, 50 to 65 percent slopes; Millsholm loam, 50 to 65 percent slopes; and soils that are similar to this Honker soil but are 10 to 20 inches deep to bedrock. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. Depth to sedimentary rock ranges from 20 to 40 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 4 to 23 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. Depth to sandstone or shale ranges from 15 to 20 inches. In some areas the surface layer is sandy loam.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 15 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some areas the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope, the areas of Rock outcrop, and the very low to low available water capacity of the Millsholm soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

197—Honker-Quinto complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Honker soil is mainly wild oat and soft chess, and on the Quinto soil it is mainly California buckwheat, soft chess, and red brome. Elevation is 600 to 1,900 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 45 percent Honker sandy loam and 40 percent Quinto gravelly sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Honker sandy loam, 50 to 65 percent slopes; soils that are similar to the Honker soil but are less than 10 to 20 inches deep to bedrock; Quinto gravelly sandy loam, 50 to 75 percent slopes; and Millsholm loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. Depth to sedimentary rock ranges from 20 to 40 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 4 to 23 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Quinto soil is shallow and somewhat excessively drained. It formed in material derived dominantly from sandstone conglomerate. Typically, the surface layer is yellowish brown gravelly sandy loam about 6 inches thick. It is 15 percent gravel. The subsoil is brown gravelly sandy clay loam about 11 inches thick. It is 15 percent gravel. Sandstone conglomerate is at a depth of 17 inches. Depth to sandstone conglomerate or fractured sandstone ranges from 10 to 20 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is sandy loam.

Permeability of the Quinto soil is moderately slow. Available water capacity is very low. Effective rooting depth is limited by sandstone conglomerate or fractured sandstone at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope and by the very low available water capacity and eroded surface layer of the Quinto soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, wild pigs, and quail. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

198—Kesterson sandy loam. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the unit. The characteristic plant community is mainly soft chess and mouse barley. Elevation is 70 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown

sandy loam about 1.5 inches thick. The subsurface layer is gray and dark gray loam about 1.5 inches thick. The subsoil is gray, olive gray, and light brownish gray clay loam about 23 inches thick. It has brownish yellow and very dark gray mottles. The upper 20 inches of the substratum is light brownish gray and light gray clay loam that has yellowish brown mottles, and the lower part to a depth of 60 inches or more is pale olive loam that has yellowish brown mottles. This soil is calcareous below a depth of 3 inches, and it has excess lime below a depth of 26 inches. It is sodic below a depth of 3 inches. In some areas the surface layer is loam, clay loam, or fine sandy loam, and in some areas the subsoil is clay.

Included in this unit is about 10 percent Edminster loam. Also included are small areas of Turlock sandy loam and Kesterson sandy loam, ponded, in wetter areas; Checker loam in higher lying areas; and Xerofluvents, channeled, in drainageways. Included areas make up about 35 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Kesterson soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more, but it is restricted by excess lime at a depth of about 24 to 33 inches. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through April. Large flood control levees and river bypasses are used to protect the soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. Areas adjacent to sloughs are used as riparian wildlife habitat. This unit can be used for irrigated pasture and as habitat for waterfowl.

The production of forage on this unit is limited by the excess sodium and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The sloughs in this unit provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

If this unit is used for hay and pasture, the main limitations are the excess sodium, wetness, excess lime in the substratum, and hummocky microrelief. Irrigation water can be applied by the border or sprinkler methods. Leveling helps to ensure the uniform application of water. Where the substratum is exposed by leveling, the excess lime can cause iron chlorosis in some crops. Adding iron supplements can correct this condition. Subsoiling improves water infiltration and allows salts to be leached downward. The concentration of sodium limits the production of plants suitable for hay and pasture. Leaching the salts is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil in this unit. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used as habitat for waterfowl, it is limited mainly by excess sodium. Outlets should be provided to regulate the depth of the water. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

199—Kesterson sandy loam, ponded. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky. The characteristic plant community is mainly saltgrass, annual barley, alkali sacaton, and filaree. Elevation is 80 to 85 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light brownish gray sandy loam about 6 inches thick. The upper 5 inches of the subsoil is olive gray clay loam that has light olive gray mottles, and the lower 15 inches is light olive gray and light gray clay loam. The upper 17 inches of the substratum is white and pale yellow clay loam that has light olive brown mottles, and the lower part to a depth of 60 inches or more is pale yellow, stratified sandy loam, fine sandy loam, and loam that has yellow mottles. This soil is calcareous below a depth of 11 inches, and it has excess lime between depths of 11 and 43 inches. It is sodic below a depth of 6 inches. In some areas the surface layer is loam, clay loam, or sandy clay loam, and in some areas the subsoil is clay.

Included in this unit are small areas of Turlock sandy loam. Also included are areas of Bolfar clay loam, partially drained, in the lower lying areas. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Kesterson soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more, but it is restricted by excess lime between depths of 11 and 43 inches. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through April.

This unit is used mainly for wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as wetland wildlife habitat. It is limited mainly by excess sodium. Species that are tolerant of wet, sodic conditions should be selected for planting. Baltic rush, jointgrass, and saltgrass provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable plants can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to support wetland habitat and to prevent the buildup of toxic salts in the soil. Water in ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of vegetation more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

The production of forage on this unit is limited by the excess sodium and the periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

200—Kesterson loam, ponded. This very deep, poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky. The characteristic plant community is mainly saltgrass, annual barley, alkali sacaton, and filaree. Elevation is 90 to 100 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light brownish gray loam about 6 inches thick. The upper 5 inches of the subsoil is olive gray clay loam that has light olive gray mottles, and the lower 15 inches is light olive gray and light gray clay loam. The upper 17 inches of the substratum is white and pale yellow clay loam that has light olive brown mottles, and the lower part to a depth of 60 inches or more is pale yellow, stratified sandy loam, fine sandy loam, and loam that has yellow mottles. This soil is calcareous below a depth of 11 inches, and it has excess lime between depths of 11 and 43 inches. It is sodic below a depth of 6 inches. In some areas the surface layer is sandy loam, clay loam, or sandy clay loam, and in some areas the subsoil is clay.

Included in this unit are small areas of Bolfar clay loam, partially drained; Dospalos clay loam, partially drained; and Triangle clay. These soils are in small depressional areas and drainageways. Also included are small areas of Agnal clay loam and Turlock sandy loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Kesterson soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more, but it is restricted by excess lime between depths of 11 and 43 inches. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through April.

This unit is used mainly for wetland wildlife habitat. It is also used as rangeland

This unit is suited to use as wetland wildlife habitat. It is limited mainly by excess sodium. Species that are tolerant of wet, sodic conditions should be selected for planting. Baltic rush, jointgrass, and saltgrass provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable vegetation can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts; stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas of wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of vegetation more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

The production of forage on this unit is limited by the excess sodium and the periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

201—Kesterson-Edminster complex. This map unit is in the valley basin. Slope is 0 to 2 percent. The microrelief is hummocky, and numerous sloughs dissect the unit. The characteristic plant community is mainly soft chess and mouse barley. Elevation is 70 to 90 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 60 percent Kesterson sandy loam and 30 percent Edminster loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Turlock sandy loam and Kesterson sandy loam, ponded, in the wetter areas; Checker loam in the higher lying areas; and Xerofluvents, channeled, in drainageways. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The Kesterson soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is dark grayish brown sandy loam about 1.5 inches thick. The subsurface layer is gray and dark gray loam about 1.5 inches thick. The subsoil is gray, olive gray, and light brownish gray clay loam about 23 inches thick. It has brownish yellow and very dark gray mottles. The upper 20 inches of the substratum is light brownish gray and light gray clay loam that has yellowish brown mottles, and the lower part to a depth of 60 inches or more is pale olive loam that has yellowish brown mottles. This soil is calcareous below a depth of 3 inches, and it has excess lime below a depth of 26 inches. It is sodic below a depth of 3 inches. In some areas the surface layer is loam, clay loam, or fine sandy loam, and in some areas the subsoil is clay.

Permeability of the Kesterson soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more, but it is restricted by excess lime at a depth of about 24 to 33 inches. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through April. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

The Edminster soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from granitic rock. Typically, the surface layer is gray loam about 4 inches thick. The upper 5 inches of the subsoil is gray and olive clay loam, and the lower 17 inches is

olive gray and grayish brown clay loam that has dark gray and light gray mottles. The upper 13 inches of the substratum is grayish brown and light brownish gray clay loam, and the lower part to a depth of 60 inches or more is pale yellow and light olive gray clay loam over loam that has olive yellow and brownish yellow mottles. This soil is calcareous below a depth of 4 inches. It is saline-sodic in the subsoil and saline in the substratum. In some areas the surface layer is fine sandy loam, sandy loam, or clay oam.

Permeability of the Edminster soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through April. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. Areas adjacent to sloughs are used for riparian wildlife habitat. This unit can be used for irrigated pasture and as habitat for waterfowl.

The production of forage on this unit is limited by the excess sodium and low rainfall and by the excess salts in the Edminster soil. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of sufficient cover and water. The sloughs in this unit provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

If this unit is used for hay and pasture, the main limitations are excess sodium, wetness, and hummocky microrelief. The Kesterson soil is also limited by excess lime, and the Edminster soil is limited by excess salts. Irrigation water can be applied by the border or sprinkler methods. Leveling helps to ensure the uniform application of water. Where the substratum is exposed by leveling, the excess lime can cause iron chlorosis in some crops. Adding iron supplements can correct this condition. Subsoiling improves water infiltration and allows salts and sodium to be leached downward. The concentration of salts and sodium limits the production of plants suitable for hay and pasture. Leaching the salts is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used as habitat for waterfowl, it is limited mainly by the excess sodium in the soils and the excess salts in the Edminster soil. Outlets should be provided to regulate the depth of the water. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soils. If fields are leveled for ponds, some natural mounds should be left within the ponded area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

202—Laveaga-Lecrag complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Laveaga soil is mainly blue oak, soft chess, ripgut brome, and wild oat with a total tree canopy of 50 to 70 percent, and on the Lecrag soil it is mainly blue oak, soft chess, and wild oat with a total tree canopy of 50 to 60 percent. Elevation is 1,100 to 3,200 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 57 to 60 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 45 percent Laveaga sandy clay loam and 35 percent Lecrag clay. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent soils that are similar to this Laveaga soil but are 20 to 40 inches deep and have a loam subsoil. Also included are small areas of Cole Variant clay loam, 2 to 5 percent slopes; Ararat extremely stony loam, 30 to 50 percent slopes; Rock

outcrop: Hytop sandy loam, 30 to 50 percent slopes; Laveaga Variant clay, 50 to 75 percent slopes; Laveaga sandy clay loam, 50 to 75 percent slopes; and Altamont Variant clay, 30 to 50 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Laveaga soil is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the surface layer is dark brown and dark yellowish brown sandy clay loam about 18 inches thick. The upper 9 inches of the subsoil is strong brown and reddish yellow sandy clay, and the lower 21 inches is brown and strong brown sandy loam. Brownish yellow and yellow, strongly weathered andesitic flow material is at a depth of 48 inches. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches. In some areas the surface layer is loam.

Permeability of the Laveaga soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow material or agglomerate at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Lecrag soil is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the surface layer is dark grayish brown over very dark grayish brown clay about 26 inches thick. The upper 9 inches of the underlying material is brown and very dark grayish brown sandy clay, and the lower part to a depth of 46 inches is strong brown sandy clay loam. Brown and light brown, strongly weathered andesitic flow material is at a depth of 46 inches. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 3 inches at the surface. In some areas the surface layer is sandy clay.

Permeability of the Lecrag soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow material or agglomerate at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as wild pigs and deer. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kind of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. Conventional methods of harvesting firewood generally are suitable, but the soil may become compacted if heavy equipment is used when the soil is wet. This unit can produce about 25 cords of wood per acre in a stand of trees that average 5.0 to 6.5 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIe (15), nonirrigated.

203—Laveaga-Lecrag complex, 50 to 75 percent slopes. This map unit is on mountains. The characteristic plant community on the Laveaga soil is mainly blue oak, soft chess, ripgut brome, and wild oat with a total tree canopy of 50 to 70 percent, and on the Lecrag soil it is mainly blue oak, soft chess, and wild oat with a total tree canopy of 50 to 60 percent. Elevation is 1,100 to 3,200 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 57 to 60 degrees F, and the

average frost-free period is 190 to 230 days.

This unit is 45 percent Laveaga sandy clay loam and 35 percent Lecrag clay. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent soils that are similar to this Laveaga soil but are 20 to 40 inches deep and have a loam subsoil. Also included are small areas of Rock outcrop; Laveaga sandy clay loam, 30 to 50 percent slopes; Lecrag clay 30 to 50 percent slopes; Altamont Variant clay, 30 to 50 percent slopes; and Hytop sandy loam, 30 to 50 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Laveaga soil is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the surface layer is dark brown and dark yellowish brown sandy clay loam about 18 inches thick. The upper 9 inches of the subsoil is strong brown and reddish yellow sandy clay, and the lower 21 inches is brown and strong brown sandy loam. Brownish yellow and yellow, strongly weathered andesitic flow material is at a depth of 48 inches. In some areas the surface layer is loam. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches. In some areas the soil is yellowish red.

Permeability of the Laveaga soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow material or agglomerate at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Lecrag soil is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the surface layer is dark grayish brown over very dark grayish brown clay about 26 inches thick. The upper 9 inches of the underlying material is brown and very dark grayish brown sandy clay, and the lower part to a depth of 46 inches is strong brown sandy clay loam. Brown and light brown, strongly weathered andesitic flow material is at a depth of 46 inches. In some areas the surface layer is sandy clay. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 3 inches at the surface.

Permeability of the Lecrag soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow material or agglomerate at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. Steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as wild pigs and deer. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kind of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. Conventional methods of harvesting firewood generally are suitable, but the soil may become compacted if heavy equipment is used when the soil is wet. This unit can produce about 25 cords of wood per acre in a stand of trees that average 5.0 to 6.5 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

204—Laveaga complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant

community is mainly blue oak, soft chess, ripgut brome, and wild oat with a total tree canopy of 50 to 70 percent. Elevation is 2,000 to 3,200 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 57 to 60 degrees F and the average frost-free period is 190 to 230 days.

This unit is 60 percent Laveaga very stony clay loam and 25 percent Laveaga clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Ararat extremely stony loam, 30 to 50 percent slopes. Also included are small areas of soils that are similar to the Laveaga very stony clay loam but have slopes of more than 50 percent and have a yellowish red layer; Laveaga sandy clay loam, 30 to 50 percent slopes; and Lecrag clay, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Laveaga very stony clay loam is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the upper 4 inches of the surface layer is brown very stony clay loam that is 10 percent stones and the lower 12 inches is dark brown clay loam that is 5 percent stones. The upper 14 inches of the subsoil is brown clay that is 5 percent stones, and the lower 12 inches is brown loam that is 5 percent stones. Reddish brown, strongly weathered andesitic flow material s at a depth of 42 inches. In some areas the surface layer is loam or clay. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches.

Permeability of the Laveaga very stony clay oam is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow mater al or agglomerate at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Laveaga clay loam is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the upper 4 inches of the surface layer is brown clay loam and the lower 12 inches is dark brown clay loam. The upper 14 inches of the subsoil is brown clay, and the lower 12 inches is brown loam. Reddish brown, strongly weathered andesitic flow material is at a depth of 42 inches. In some areas the surface layer is loam or clay. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches.

Permeability of the Laveaga clay loam is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow material or agglomerate at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as wild pigs and deer. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope and by stones on the surface of the Laveaga very stony clay loam. These limitations restrict the use of equipment. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 30 cords of wood per acre in a stand of trees that average 5 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIe (15), nonirrigated.

205—Laveaga-Hytop complex, 50 to 65 percent slopes. This map unit is on mountains. The characteristic plant community on the Laveaga soil is mainly blue oak, soft chess, ripgut brome, and wild oat with a total tree canopy of 50 to 70 percent, and on the Hytop soil it is mainly wild oat and soft chess. Elevation

is 1,100 to 3,300 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 57 to 63 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 50 percent Laveaga sandy clay loam and 35 percent Hytop sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Quinto gravelly sandy loam, 50 to 75 percent slopes, on south-facing side slopes. Also included are small areas of Rock oucrop; Laveaga sandy clay loam, 30 to 50 percent slopes; Hytop sandy loam, 30 to 50 percent slopes; and Altamont Variant clay, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Laveaga soil is deep and well drained. It formed in material derived dominantly from andesitic flow material and agglomerate. Typically, the surface layer is dark brown and dark yellowish brown sandy clay loam about 18 inches thick. The upper 9 inches of the subsoil is strong brown and reddish yellow sandy clay, and the lower 21 inches is brown and strong brown sandy loam. Brownish yellow and yellow, strongly weathered andesitic flow material is at a depth of 48 inches. Depth to andesitic flow material or agglomerate ranges from 40 to 60 inches. In some areas the surface layer is loam.

Permeability of the Laveaga soil is slow. Available water capacity is moderate to high. Effective rooting depth is limited by andesitic flow material or agglomerate at a depth of 40 to 60 inches. Runoff is rapid, and the hazard of water erosion is high.

The Hytop soil is moderately deep and well drained. It formed in material derived dominantly from basic volcanic rock. Typically, the upper 5 inches of the surface layer is pale brown sandy loam and the lower 5 inches is brown sandy clay loam. The subsoil is strong brown and brown clay about 12 inches thick. The substratum is brown and strong brown clay about 4 inches thick. Calcareous, brownish yellow, yellowish red, and white, strongly weathered basic volcanic rock is at a depth of 26 inches. Depth to calcareous, strongly weathered basic volcanic rock ranges from 20 to 40 inches. In some areas the surface layer is loam or sandy clay loam.

Permeability of the Hytop soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 9 to 16 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as range and and wildlife habitat. It can be used for firewood production.

The production of forage on this unit is limited by slope. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as wild pigs and deer. It has few limitations. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kind of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion and the cost of harvesting. This unit can produce about 30 cords of wood per acre in a stand of trees that average 5 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

206—Los Banos clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on leveled terraces. It formed in calcareous gravelly alluvium derived from various kinds of rock. Elevation is 130 to 160 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees

F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 10 inches thick. The upper 15 inches of the subsoil is brown and strong brown clay, and the lower 17 inches is strong brown clay. The substratum to a depth of 60 inches or more is reddish yellow gravelly clay loam that is 25 percent gravel. This soil is calcareous below a depth of 25 inches. In some areas the surface layer is gravelly clay loam.

Included in this unit are small areas of Woo loam, gravelly substratum, 0 to 2 percent slopes; Woo clay loam, 0 to 2 percent slopes; Stanislaus clay loam; Stanislaus clay loam, wet; and Damluis clay loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Los Banos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly walnuts, beans, tomatoes, alfalfa, and cherries. A few areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for homesite development, the main limitations are the slow permeability, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIs-3 (17), irrigated, and IVs-3 (17), nonirrigated.

207—Los Banos clay loam, 2 to 8 percent slopes. This very deep, well drained soil is on terraces. It formed in calcareous gravelly alluvium derived from various kinds of rock. The characteristic plant community in areas not cultivated is mainly soft chess, red brome, wild oat, and filaree. Elevation is 250 to 1,000 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown clay loam about 9 inches thick. The upper 6 inches of the subsoil is brown clay, and the lower 40 inches is strong brown over yellowish red clay. The substratum to a depth of 60 inches or more is reddish yellow cobbly clay loam that is 25 percent gravel and cobbles. This soil is calcareous below a depth of 9 inches, and it has excess lime below a depth of 15 inches. In some areas the surface layer is gravelly clay loam or is dark reddish brown.

Included in this unit are small areas of Apollo loam, 2 to 8 percent slopes; Los Banos clay loam, 0 to 2 percent slopes; Los Banos clay loam, 8 to 15 percent slopes; soils that are similar to this Los Banos soil but are clayey throughout; Arburua loam, 2 to 8 percent slopes; and Arburua loam, 8 to 15 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Los Banos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly cotton and sugar beets. Among the other crops grown are grapes. Some areas are used for nonirrigated small grain, as rangeland and wildlife habitat, and for urban development.

This unit is suited to irrigated crops. It is limited mainly by slow permeability, steepness of slope, and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. The excess lime in the lower part of the subsoil and the substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

Because of the steepness of slope, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. To avoid

overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall and steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are the slow permeability, high shrink-swell potential, steepness of slope, and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIe-3 (17), irrigated, and IVe-3 (17), nonirrigated.

208—Los Banos clay loam, 8 to 15 percent slopes. This very deep, well drained soil is on terraces. It formed in calcareous gravelly alluvium derived from various kinds of rock. The characteristic plant community in areas not cultivated is mainly soft chess, red brome, wild oat, and filaree. Elevation is 220 to 900 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown clay loam about 9 inches thick. The upper 6 inches of the subsoil is brown clay, and the lower 40 inches is strong brown over yellowish red clay. The substratum to a depth of 60 inches or more is reddish yellow cobbly clay loam that is 25 percent gravel and cobbles. This soil is calcareous below a depth of 9 inches, and it has excess lime below a depth of 15 inches. In some areas the surface layer is gravelly clay loam.

Included in this unit are small areas of Los Banos clay loam, 2 to 8 percent slopes; Chaqua loam, 2 to 8 percent slopes; soils that are similar to this Los Banos soil but are clayey throughout; Arburua loam, 15 to 30 percent slopes; and San Timoteo sandy loam, 15 to 30 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Los Banos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This unit is used for irrigated crops, mainly cotton and sugar beets. It is also used for nonirrigated small grain, as rangeland and wildlife habitat, and for urban development.

This unit is suited to irrigated crops. It is limited by steepness of slope, slow permeability, and excess lime. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. The excess lime in the lower part of the subsoil and the substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

Because of the steepness of slope, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall and steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are the slow permeability, steepness of slope, high shrink-swell potential, and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

209—Los Banos-Pleito clay loams, 2 to 8 percent slopes. This map unit is on colluvial and alluvial fans and terraces. Elevation is 350 to 500 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 40 percent Los Banos clay loam and 25 percent Pleito clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent soils that are similar to this Pleito soil but are more than 35 percent gravel throughout the profile. Also included are small areas of soils that are similar to this Los Banos soil but are clayey throughout the profile; Paver clay loam, 2 to 5 percent slopes; and Pleito gravelly clay loam, 8 to 15 percent slopes. Included areas make up about 35 percent of the total acreage. The percentage varies from one area to another.

The Los Banos soil is very deep and well drained. It formed in calcareous gravelly alluvium derived from various kinds of rock. Typically, the surface layer is brown clay loam about 9 inches thick. The upper 6 inches of the subsoil is brown clay, and the lower 40 inches is strong brown over yellowish red clay. The substratum to a depth of 60 inches or more is reddish yellow cobbly clay loam that is 25 percent gravel and cobbles. This soil is calcareous below a depth of 9 inches, and it has excess lime below a depth of 15 inches. In some areas the surface layer is gravelly clay loam or is dark reddish brown.

Permeability of the Los Banos soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The Pleito soil is very deep and well drained. It formed in colluvium and alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown clay loam about 18 inches thick. The subsoil is pale brown clay loam about 6 inches thick. The upper 21 inches of the substratum is light yellowish brown gravelly clay loam that is 15 percent gravel, and the lower part to a depth of 60 inches or more is pale yellow gravelly sandy clay loam that is 15 percent gravel. This soil is calcareous below a depth of 24 inches, and it has excess lime between depths of 24 and 45 inches. In some areas the surface layer is gravelly clay loam.

Permeability of the Pleito soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly for irrigated crops, mainly

cotton, tomatoes, and cantaloup. It is also used for urban development.

This unit is suited to irrigated crops. It is limited mainly by steepness of slope and excess lime. The Los Banos soil is also limited by slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. The excess lime can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

Because of the steepness of slope, only sprinkler or drip irrigation is suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope.

If this unit is used for urban development, the main limitations are the restricted permeability, steepness of slope, and restricted load supporting capacity. The Los Banos soil is also limited by high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the restricted permeability. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIe-3 (17), irrigated, and IVe-3 (17), nonirrigated.

210—Los Banos Variant gravelly sandy clay loam. This very deep, well drained soil is on low terraces. It formed in gravelly alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 120 to 180 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown over brown gravelly sandy clay loam about 16 inches thick. It is 15 to 20 percent gravel. The upper 14 inches of the subsoil is brown gravelly clay loam that is 15 to 25 percent gravel, and the lower 7 inches is strong brown gravelly sandy clay loam that is 25 percent gravel. The substratum to a depth of 60 inches or more is strong brown over light yellowish brown extremely gravelly coarse sandy loam that is 65 percent gravel. In some areas the surface layer is gravelly loam or gravelly clay loam.

Included in this unit are small areas of Damluis clay loam, 0 to 2 percent slopes; Stanislaus clay loam; Woo clay loam, 0 to 2 percent slopes; and Woo sandy clay loam, 0 to 2 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Los Banos Variant soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly cotton, sugar beets, walnuts, and corn. Among the other crops grown are alfalfa and beans. Some areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by the content of gravel and low to moderate available water capacity. These limitations should be considered when planning irrigation systems. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for homesite development, the main limitations are the risk of seepage, moderate shrink-swell potential, and moderately slow permeability. If the density of housing is moderate to high, community sewage systems may be needed. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability.

This map unit is in capability units IIs-4 (17), irrigated, and IVs-4 (17), nonirrigated.

211—Marcuse silty clay. This very deep, poorly drained soil is on the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary

rock. Slope is 0 to 2 percent. The characteristic plant community is mainly saltgrass and alkali heath. Elevation is 70 to 90 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light gray silty clay about 4 inches thick. The subsoil is light brownish gray and pale brown clay about 10 inches thick. It has seams of gypsum and has dark brown mottles when moist. The substratum to a depth of 60 inches or more is calcareous, light yellowish brown clay. It has seams of gypsum and light greenish gray mottles. This soil is saline-sodic throughout. In some areas the surface layer is clay, silty clay loam, or clay loam.

Included in this unit are small areas of Triangle clay and Triangle clay, sodic. Also included are small areas of Pedcat loam, 0 to 2 percent slopes, in the higher lying areas. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Marcuse soil is slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in November through April; however, in some years many areas become inundated because of water encroaching from ponded areas and stream overflow.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by excess salts and sodium and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is used as habitat for wildlife such as rabbits and pheasants. It is limited mainly by a lack of adequate water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used as habitat for waterfowl, it is limited mainly by excess salts and sodium and high shrink-swell potential. Outlets should be provided to regulate the depth of the water. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. High shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the qual ty of water supplies.

This map unit is in capability subclass VIIw (17), nonirrigated.

212—Marcuse clay, leveled. This very deep, poorly drained soil is on the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 80 to 90 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is gray clay about 11 inches thick. It has masses of gypsum. The subsoil is calcareous, olive gray clay about 7 inches thick. The upper 31 inches of the substratum is calcareous, olive gray clay that has dark greenish gray mottles when moist, and the lower part to a depth of 60 inches or more is olive gray clay loam. This soil is saline-sodic throughout. In some areas texture of the surface layer varies because of leveling.

Included in this unit are small areas of Turlock loam, leveled; Alros clay loam, partially drained; Elnido sandy loam, partially drained; Volta clay loam, leveled; Britto clay loam, leveled; Triangle clay; and Triangle clay, sodic. The percentage varies from one area to another.

Permeability of this Marcuse soil is slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 36 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated pasture. A few areas are used for irrigated small grain.

This unit is suited to hay and pasture. The main limitations are excess salts and sodium and wetness. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Irrigation water can be applied by the border or sprinkler methods. Water needs to be applied carefully to prevent

the buildup of a high water table during the growing season. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. The concentration of salts and sodium in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

If this unit is used for irrigated small grain, the main limitations are excess salts and sodium, wetness, and the clay texture of the surface layer. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

213—Millsholm loam, 8 to 15 percent slopes. This shallow, well drained soil is on mountains. It formed in material derived dominantly from sandstone and shale. The characteristic plant community is mainly filaree, soft chess, and foxtail fescue. Elevation is 1,300 to 1,500 feet. The average annual precipitation is about 15 to 20 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 230 days.

Included in this unit are small areas of Millsholm loam, 15 to 30 percent slopes; soils that are similar to this Millsholm soil but are 5 to 10 inches deep; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 10 to 20 inches. In some areas the surface is dark grayish brown.

Permeability of this Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as annual rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the very low to low available water capacity of the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Rangeland seeding is not feasible because of the shallow soil depth. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and rabbits. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

214—Millsholm loam, 30 to 50 percent slopes. This shallow, well drained soil is on mountains. It formed in material derived dominantly from sandstone and shale. The characteristic plant community is mainly filaree, soft chess, and foxtail fescue. Elevation is 500 to 2,600 feet.

The average annual precipitation is about 13 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

Included in this unit are small areas of Contra Costa loam, 30 to 50 percent slopes; Fifield sandy loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Millsholm loam, 15 to 30 percent slopes; Millsholm loam, 50 to 65 percent slopes; soils that are similar to this Millsholm soil but are 5 to 10 inches thick; and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 10 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as annual rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope and the very low to low available water capacity. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

215—Millsholm loam, 50 to 65 percent slopes. This shallow, well drained soil is on mountains. It formed in material derived dominantly from sandstone and shale. The characteristic plant community is mainly filaree, soft chess, and foxtail fescue. Elevation is 500 to 3,700 feet. The average annual precipitation is about 13 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

Included in this unit are small areas of Contra Costa loam, 50 to 65 percent slopes; Fifield sandy loam, 50 to 65 percent slopes; Honker sandy loam, 50 to 65 percent slopes; Millsholm loam, 30 to 50 percent slopes; Quinto gravelly sandy loam, 40 to 75 percent slopes; soils that are similar to this Millsholm soil but are 5 to 10 inches thick; and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 10 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as annual rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope and the very low to low available water capacity. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments by the steepness of slope. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand

grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

216—Millsholm-Fifield complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Millsholm soil is mainly filaree, soft chess, and foxtail fescue, and on the Fifield soil it is mainly blue oak, soft chess, and wild oat with a total tree canopy of 30 to 50 percent. Elevation is 500 to 1,600 feet. The average annual precipitation is about 13 to 20 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 50 percent Millsholm loam and 35 percent Fifield sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Fifield sandy loam, 50 to 65 percent slopes; Franciscan sandy loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Millsholm loam, 15 to 30 percent slopes; Millsholm loam, 50 to 65 percent slopes; Rock outcrop; and soils that are similar to this Fifield soil but have an average annual soil temperature of less than 59 degrees F. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 10 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Fifield soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary and metamorphic rock. Typically, the surface layer is brown sandy loam about 5 inches thick. It is 10 percent gravel. The subsoil is yellowish brown very gravelly loam about 10 inches thick. It is 40 percent gravel. The substratum is yellowish brown over light yellowish brown extremely gravelly loam about 15 inches thick. It is 75 percent angular gravel. Slightly weathered, fractured sandstone is at a depth of 30 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to sedimentary or metamorphic rock ranges from 20 to 35 inches.

Permeability of the Fifield soil is moderate. Available water capacity is very low to low; however, trees can extract water from the underlying fractured rock. Effective rooting depth is limited by sedimentary or metamorphic rock at a depth of 20 to 35 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as wildlife habitat. It is also used as rangeland. It can be used for firewood production.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The production of forage on this unit is limited by the very low to low available water capacity and slope and by the tree canopy on the Fifield soil. If trees and shrubs are managed to create open areas, the unit can produce a good stand of forage plants. Leaving vegetation in drainageways and leaving some scattered trees standing help to control erosion and preserve the wildlife habitat and esthetic value. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe

decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanica treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is suited to the production of firewood. Harvesting of firewood is limited mainly by slope. The steepness of slope limits the kinds of equipment that can be used. Proper design, location, and maintenance of access roads reduce the risk of erosion. This unit can produce about 22 cords of wood per acre in a stand of trees that average 11 inches in diameter at breast height. If regeneration of the woodland is planned, protection from grazing should be provided to allow stump sprouts to become established.

This map unit is in capability subclass VIIe (15), nonirrigated.

217—Millsholm-Honker-Rock outcrop complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Millsholm soil is mainly filaree, soft chess, and foxtail fescue, and on the Honker soil it is mainly wild oat and soft chess. Elevation is 700 to 2,000 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 45 percent Millsholm loam, 20 percent Honker sandy loam, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Millsholm loam, 15 to 30 percent slopes; Millsholm loam, 50 to 65 percent slopes; Contra Costa loam, 30 to 50 percent slopes; Honker sandy loam, 50 to 65 percent slopes; soils that are similar to this Honker soil but are 10 to 20 inches deep to bedrock; and Quinto gravelly sandy loam, 40 to 75 percent slopes. Included areas make up about 15 percent of the total acreage.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 15 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 15 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Honker soil is moderately deep and well drained. It formed in material derived dominantly from sedimentary rock. Typically, the upper 7 inches of the surface layer is brown sandy loam that is 5 percent gravel and the lower 7 inches is light yellowish brown and strong brown sandy clay loam. The subsoil is reddish yellow clay about 14 inches thick. It is 10 percent angular gravel in the lower part. The substratum is light yellowish brown clay loam about 10 inches thick. It is 5 percent angular gravel. Sandstone is at a depth of 38 inches. In some areas the surface layer is clay loam, sandy clay loam, or gravelly sandy loam. Depth to sedimentary rock ranges from 20 to 40 inches.

Permeability of the Honker soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 20 to 40 inches, but it is restricted by the content of clay at a depth of 8 to 23 inches. Runoff is rapid, and the hazard of water erosion is moderate.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope, by the very low to low available water capacity of the Millsholm soil, and by the areas of Rock outcrop. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering

ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

218—Millsholm-Rock outcrop complex, 15 to 30 percent slopes. This map unit is on mountains. The characteristic plant community is mainly filaree, soft chess, and foxtail fescue. Elevation is 500 to 1,400 feet. The average annual precipitation is about 13 to 20 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 60 percent Millsholm loam and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Millsholm loam, 8 to 15 percent slopes; Millsholm loam, 30 to 50 percent slopes; Contra Costa loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; and soils that are similar to this Millsholm soil but are 5 to 10 inches thick. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is dark grayish brown sandy loam. Depth to sandstone or shale ranges from 10 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the very low to low available water capacity of the Millsholm soil and by the areas of Rock outcrop. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling by livestock and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and rabbits. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

219—Millsholm-Rock outcrop complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community is mainly filaree, soft chess, and foxtail fescue. Elevation is 600 to 2,000 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 60 percent Millsholm loam and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Millsholm loam, 15 to 30 percent slopes; Millsholm loam, 50 to 65 percent slopes; Contra Costa loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Quinto gravelly sandy loam, 40 to 75 percent slopes; and soils that are similar to this Millsholm soil but are 5 to 10 inches thick. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. The subsoil is light brown loam about 5 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 11 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 10 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective

rooting depth is limited by sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope, the very low to low available water capacity and shallow depth of the Millsholm soil, and the areas of Rock outcrop. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

220—Mollic Xerofluvents, channeled. These very deep, somewhat poorly drained to excessively drained soils are on flood plains of mountain and foothill streams. These soils formed in gravelly alluvium derived from various kinds of rock. Slope is 0 to 2 percent. The native vegetation is mainly annual grasses, forbs, shrubs, and scattered trees. Elevation is 80 to 1,400 feet. The average annual precipitation is about 9 to 20 inches, the average annual air temperature is 59 to 64 degrees F, and the average frost-free period is 190 to 280 days.

No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of brown sandy loam about 24 inches thick. The underlying material to a depth of 60 inches or more is extremely gravelly sand that is 30 percent cobbles and 60 percent gravel. In some areas the surface layer is fine sandy loam or loam.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes; Woo clay loam, 0 to 2 percent slopes; Bapos clay loam, 2 to 8 percent slopes; Carranza gravelly clay loam, 2 to 8 percent slopes; Damluis clay loam, 2 to 8 percent slopes; Anela gravelly loam, 0 to 2 percent slopes; Herito loam; Yokut Variant loam; Orognen sandy loam, 2 to 5 percent slopes; Vernalis loam, 2 to 5 percent slopes; Peckham cobbly loam, 2 to 5 percent slopes; and Ararat extremely stony loam, 8 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of these Mollic Xerofluvents is moderate to moderately rapid over rapid to very rapid. Available water capacity is very low to moderate. Effective rooting depth is limited by the extremely gravelly sand at a depth of 6 to 36 inches. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 inches or more in December through April. These soils are subject to brief periods of flooding in December through March. They are subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used as rangeland and riparian wildlife habitat.

The production of forage on this unit is limited by the very low to moderate available water capacity. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, wild pigs, rabbits, and doves. Small streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

This map unit is in capability subclass VIe (17), nonirrigated.

221—Oneil silt loam, 8 to 15 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community in areas not cultivated is mainly soft chess and wild oat. Elevation is 200 to 700 feet. The average

annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown silt loam about 21 inches thick. The underlying material, to a depth of 29 inches, is yellowish brown silt loam. Calcareous sandstone and shale are at a depth of 29 inches. This soil is calcareous throughout. Depth to sandstone and shale ranges from 20 to 40 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is silty clay loam, sandy clay loam, or loam.

Included in this unit are about 10 percent Oneil silt loam, 15 to 30 percent slopes, and small areas of Ballvar loam, 2 to 8 percent slopes; Arburua loam, 8 to 15 percent slopes; Oquin Variant fine sandy loam, 15 to 30 percent slopes; and Damluis clay loam, 2 to 8 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Oneil soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sandstone or shale at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat and for nonirrigated small grain.

The production of forage on this unit is limited by the eroded surface layer. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall and the steepness of slope. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Cross-slope cultivation reduces runoff and erosion and provides for better water intake and storage and thus increases crop yields.

This map unit is in capability unit IVe-1 (15), nonirrigated.

222—Oneil silt loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly soft chess and wild oat. Elevation is 300 to 1,200 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown silt loam about 21 inches thick. The underlying material, to a depth of 29 inches, is yellowish brown silt loam. Calcareous sandstone and shale are at a depth of 29 inches. The soil is calcareous throughout. Depth to sandstone and shale ranges from 20 to 40 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is silty clay loam, sandy clay loam, or loam.

Included in this unit are small areas of Oneil silt loam, 8 to 15 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Ayar clay, 15 to 30 percent slopes; Ayar clay, 30 to 50 percent slopes; Arburua loam, 15 to 30 percent slopes; Arburua loam, 30 to 50 percent slopes; Wisflat sandy loam, 15 to 30 percent slopes; Damluis clay loam, 2 to 8 percent slopes; Rock outcrop; and Apollo clay loam, 15 to 30 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Oneil soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sandstone or shale at a depth of 20 to 40 inches. Runoff is medium, and the

hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the eroded surface layer. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit causes the natural plant community to deteriorate and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided on the steeper slopes. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

Areas of this unit adjacent to small streams produce habitat for wildlife such as doves, deer, and wild pigs. These areas are limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (17), nonirrigated.

223—Oneil silt loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on foothills. It formed in material derived dominantly from calcareous shale and sandstone. The characteristic plant community is mainly soft chess and wild oat. Elevation is 300 to 1,400 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is brown silt loam about 21 inches thick. The underlying material, to a depth of 29 inches, is yellowish brown silt loam. Calcareous sandstone and shale are at a depth of 29 inches. This soil is calcareous throughout. Depth to sandstone and shale ranges from 20 to 40 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is silty clay loam, sandy clay loam, or loam.

Included in this unit is about 10 percent Oneil silt loam, 8 to 15 percent slopes. Also included are small areas of Oneil silt loam, 15 to 30 percent slopes; Arburua loam, 30 to 50 percent slopes; Ayar clay, 30 to 50 percent slopes; Conosta clay loam, 8 to 15 percent slopes; Conosta clay loam, 15 to 30 percent slopes; soils that are similar to this Oneil soil but have slopes of 50 to 70 percent; Rock outcrop; and Wisflat sandy loam, 30 to 50 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Oneil soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by sandstone or shale at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope and the eroded surface layer. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Mechanical treatment is not practical because of the steepness of slope. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves,

deer, and wild pigs. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated

224—Oquin fine sandy loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on low foothills. It formed in material derived dominantly from calcareous sandstone. The charactistic plant community is mainly soft chess and foxtail fescue. Elevation is 300 to 400 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown fine sandy loam about 32 inches thick. The underlying material, to a depth of 39 inches, is light brownish gray sandy loam. Strongly weathered, calcareous sandstone is at a depth of 39 inches. This soil is calcareous throughout. In some areas the surface layer is loam. Depth to strongly weathered sandstone ranges from 20 to 40 inches.

Included in this unit is about 15 percent soils that are similar to this Oquin soil but are 10 to 20 inches deep to strongly weathered sandstone or have slopes of 8 to 15 percent. Also included are small areas of Oneil silt loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Herito loam; and Rock outcrop. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Oquin soil is moderately rapid. Available water capacity is low to moderate. Effective rooting depth is limited by strongly weathered sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

225—Oquin fine sandy loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on low foothills. It formed in material derived dominantly from calcareous sandstone. The characteristic plant community is mainly soft chess and foxtail fescue. Elevation is 250 to 500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is grayish brown fine sandy loam about 24 inches thick. The underlying material, to a depth of 31 inches, is light brownish gray sandy loam. Strongly weathered, calcareous sandstone is at a depth of 31 inches. This soil is calcareous throughout. Depth to strongly weathered sandstone ranges from 20 to 40 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is loam.

Included in this unit is about 10 percent soils that are similar to this Oquin soil but are 40 to 60 inches deep to strongly weathered sandstone or have slopes of 8 to 15 percent. Also included are small areas of Oneil silt loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Wisflat sandy loam, 15 to 30 percent slopes; San Timoteo sandy loam, 15 to 30 percent slopes; and Rock outcrop. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Oquin soil is moderately rapid. Available water capacity is low to moderate. Effective rooting depth is limited by strongly weathered sandstone at a depth of 20 to 40 inches. Runoff is

medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the eroded surface layer. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to support livestock. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Mechanical treatment should be avoided in the steeper areas. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

226—Orognen sandy loam, 2 to 5 percent slopes. This very deep, well drained soil is on dissected terraces. It formed in alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess and wild oat. Elevation is 1,100 to 1,700 feet. The average annual precipitation is about 15 to 20 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 230 days.

Typically, the surface layer is light brown sandy loam about 16 inches thick. The upper 3 inches of the subsoil is reddish brown sandy clay loam, the next 15 inches is reddish brown clay, and the lower part to a depth of 60 inches or more is yellowish red gravelly clay loam that is 25 percent gravel. In some areas the surface layer is loam or has 1 to 3 percent organic matter.

Included in this unit are small areas of Orognen sandy loam, 30 to 50 percent slopes; Quiensabe sandy clay loam, 30 to 50 percent slopes; and Tunehill loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Orognen soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more, but it is restricted by the content of clay at a depth of about 15 to 20 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat. It can be used for nonirrigated small grain.

This unit has few limitations for the production of forage. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and to proper grazing use. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and doves. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This unit is suited to nonirrigated small grain. It is limited mainly by the very slow permeability. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

This map unit is in capability unit IIIe-3 (17), nonirrigated.

227—Orognen-Quiensabe complex, 30 to 50 percent slopes. This map unit is on dissected terraces. The characteristic plant community on the Orognen soil is mainly filaree and soft chess, and on the Quiensabe soil it is mainly soft chess, wild oat, and blue oak with a total tree canopy of 10 to 25 percent. Elevation is 700 to 1,800 feet. The average annual precipitation is about 13 to 21 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 45 percent Orognen sandy loam and 35 percent Quiensabe sandy clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Orognen sandy loam, 2 to 5 percent slopes. Also included are small areas of Contra Costa loam, 30 to 50 percent slopes; Honker sandy loam, 30 to 50 percent slopes; Millsholm loam, 30 to 50 percent slopes; Peckham cobbly loam, 30 to 50 percent slopes; Tunehill loam, 30 to 50 percent slopes; Quiensabe clay loam, 30 to 50 percent slopes; Fifield sandy loam, 30 to 50 percent slopes; and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Orognen soil is very deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light brown sandy loam about 3 inches thick. The upper 10 inches of the subsoil is pink and brown gravelly sandy clay loam that is 20 percent gravel, the next 9 inches is strong brown clay, and the lower 17 inches is strong brown clay loam that is 10 percent gravel. Below this to a depth of 60 inches or more is brown gravelly sandy clay loam that is 25 to 30 percent gravel. In some areas the surface layer is loam.

Permeability of the Orognen soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more, but it is restricted by the content of clay at a depth of about 10 to 15 inches. Runoff is rapid, and the hazard of water erosion is high.

The Quiensabe soil is moderately deep and well drained. It formed in alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown over yellowish brown sandy clay loam about 14 inches thick. It is 5 percent gravel. The subsoil is brown gravelly clay about 8 inches thick. It is 20 percent gravel. The substratum is brown, light yellowish brown, and red very gravelly clay loam about 5 inches thick. It is 40 percent gravel. Sandstone is at a depth of 27 inches. Depth to sandstone ranges from 20 to 40 inches. In some areas the surface layer is loam or clay loam.

Permeability of the Quiensabe soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by sandstone at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling by livestock and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (17), nonirrigated.

228—Palazzo sandy loam, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of open drains, which surround most cultivated areas. The soil formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief originally was hummocky, but most areas have been leveled. Elevation is 90 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is very dark gray sandy loam about 14 inches thick. The subsoil is grayish brown sandy loam about 12 inches thick. It has strong brown mottles when moist. The substratum to a depth of 60 inches or more is dark gray and grayish brown clay loam. In some areas the surface layer is loam.

Included in this unit are small areas of Bisgani loamy sand, partially drained; Elnido sandy loam, partially drained; Elnido clay loam, partially drained; Bolfar clay loam, partially drained; and Dospalos clay loam, partially drained. Included areas make up about 30

percent of the total acreage. The percentage varies from one area to another.

Permeability of the Palazzo soil is moderately rapid to a depth of 22 inches and moderately slow below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through February. Large flood control levees and river bypasses are used to protect this soil from flooding. This soil is subject to brief periods of ponding after prolonged storms in December through February.

Most areas of this unit are used for irrigated crops, mainly cotton, alfalfa, sugar beets, and corn. Among the other crops grown are barley and tomatoes. Some areas are used for homesite development and wildlife habitat.

This unit is suited to irrigated crops. It is limited mainly by wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, water should be applied at frequent intervals and runs should be short. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops.

If this unit is used for homesite development, the main limitations are wetness, the moderately slow permeability of the lower part of the soil, the risk of seepage in the substratum, and restricted load supporting capacity. Building sites should be graded to divert water away from foundations and to prevent ponding in adjacent areas. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. If drainage outlets are available, tile drains can be placed around the perimeter of septic tank absorption fields to lower the water table. If the density of housing is moderate to high, community sewage systems may be needed. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This unit provides habitat for wildlife such as doves and pheasants. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability units IIw-2 (17), irrigated, and IVw-2 (17), nonirrigated.

229—Paver clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 200 to 400 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 16 inches thick. The upper 6 inches of the underlying material is light olive brown clay loam, the next 28 inches is light olive brown over light yellowish brown clay loam, and the lower part to a depth of 60 inches or more is light yellowish brown clay loam. This soil is calcareous below a depth of 22 inches. In some areas the surface layer is silty clay loam.

Included in this unit are small areas of Woo clay loam, 0 to 2 percent slopes, and Woo clay, 0 to 2 percent slopes. Also included are small areas of Paver clay loam, 2 to 5 percent slopes; soils that are similar to this Paver soil but have slopes of 2 to 5 percent, have 10 to 30 percent gravel throughout the profile, and are adjacent to the higher lying areas; and Deldota clay, partially drained, adjacent to the higher lying areas. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Paver soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly almonds, tomatoes, and cotton. Among the other crops grown is cantaloup. Some areas are used for urban development.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in

compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for urban development, the main limitations are the moderately slow permeability and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability class I (17), irrigated, and capability subclass IVc (17), nonirrigated.

230—Paver clay loam, 2 to 5 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 300 to 400 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 16 inches thick. The upper 6 inches of the underlying material is light olive brown clay loam, the next 28 inches is light olive brown over light yellowish brown clay loam, and the lower part to a depth of 60 inches or more is light yellowish brown clay loam. This soil is 10 percent gravel throughout. It is calcareous below a depth of 22 inches. In some areas the surface layer is loam or gravelly clay loam.

Included in this unit is about 10 percent Woo clay loam, 2 to 5 percent slopes. Also included are small areas of Woo clay, 0 to 2 percent slopes, and Pleito gravelly clay loam, 8 to 15 percent slopes, in higher lying areas. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Paver soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly almonds, tomatoes, and cotton. Among the other crops grown is cantaloup. Some areas are used for urban development.

This unit is suited to irrigated crops. It is limited mainly by steepness of slope. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer and poor tilth.

Furrow, sprinkler, or trickle irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, runs should be on the contour. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope.

If this unit is used for urban development, the main limitations are the moderately slow permeability, restricted load supporting capacity, and steepness of slope. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

231—Peckham cobbly loam, 2 to 5 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from volcanic tuff conglomerate. The characteristic plant community is mainly soft chess, filaree, and foxtail fescue. Elevation is 700 to 1,700 feet. The average annual precipitation is about 13 to 20 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is brown cobbly loam about 13 inches thick. It is 10 percent cobbles and 5 percent stones. The upper 7 inches of the subsoil is strong brown very cobbly loam that is 35 percent cobbles and 15 percent stones, and the lower 4 inches is strong brown extremely cobbly clay that is 25 percent cobbles, 15 percent stones, and 30 percent gravel. Volcanic tuff conglomerate is at a depth of 24 inches. In some areas the surface layer is loam, stony loam, or cobbly sandy loam. Depth to volcanic tuff conglomerate ranges from 20 to 30 inches.

Included in this unit are small areas of Cole Variant clay loam, 2 to 5 percent slopes; Peckham cobbly loam, 5 to 15 percent slopes; and Ararat extremely stony loam, 8 to 30 percent slopes. Included areas make up

about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Peckham soil is slow. Available water capacity is very low to low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 20 to 30 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland and wildlife habitat.

The production of forage is limited by the very low to low available water capacity and the stones and cobbles on the surface. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and to proper grazing use. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

232—Peckham cobbly loam, 5 to 15 percent slopes. This moderately deep, well drained soil is on mountains. It formed in material derived dominantly from volcanic tuff conglomerate. The characteristic plant community is mainly soft chess, filaree, and foxtail fescue. Elevation is 1,400 to 2,500 feet. The average annual precipitation is about 15 to 22 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

Typically, the surface layer is brown cobbly loam about 13 inches thick. It is 10 percent cobbles and 5 percent stones. The upper 7 inches of the subsoil is strong brown very cobbly loam that is 35 percent cobbles and 15 percent stones, and the lower 4 inches is strong brown extremely cobbly clay that is 25 percent cobbles, 15 percent stones, and 30 percent gravel. Volcanic tuff conglomerate is at a depth of 24 inches. In some areas the surface layer is loam, stony loam, or cobbly sandy loam. Depth to volcanic tuff conglomerate ranges from 20 to 30 inches.

Included in this unit are small areas of Rock outcrop; Peckham cobbly loam, 2 to 5 percent slopes; Asolt very stony clay, 15 to 30 percent slopes; and Ararat extremely stony loam, 8 to 30 percent slopes. Also included are small areas of soils that are similar to this Peckham soil but have slopes of 15 to 30 percent and are north of Los Banos Creek, near electrical transmission lines. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Peckham soil is slow. Available water capacity is very low to low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 20 to 30 inches. Runoff is medium, and the hazard of water erosion is slight to moderate.

This unit is used as rangeland and wildlife habitat.

The production of forage is limited by the very low to low available water capacity and the stones and cobbles on the surface. Stones and cobbles on the surface limit access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

233—Peckham-Cole Variant association, 2 to 30 percent slopes. This map unit is on mountains, terraces, and alluvial fans. The characteristic plant community on the Peckham soil is mainly soft chess, filaree, and foxtail fescue, and on the Cole Variant soil it is mainly soft chess and pine bluegrass. Elevation is 1,700 to 3,000 feet. The average annual precipitation is about 15 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 45 percent Peckham cobbly loam and 40 percent Cole Variant clay loam. The Peckham soil is on mountains, and the Cole Variant soil is on gently sloping, small, high-elevation terraces and alluvial fans.

Included in this unit are small areas of soils that are similar to this Peckham soil but have less than 15 percent cobbles and stones throughout the profile and do not have clay in the lower part of the subsoil; Rock

outcrop; Ararat extremely stony loam, 8 to 30 percent slopes; Laveaga sandy clay loam, 30 to 50 percent slopes; Lecrag clay, 30 to 50 percent slopes; and Hytop clay, 50 to 65 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Peckham soil is moderately deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, the surface layer is brown cobbly loam about 13 inches thick. It is 10 percent cobbles and 5 percent stones. The upper 7 inches of the subsoil is strong brown very cobbly loam that is 35 percent cobbles and 15 percent stones, and the lower 4 inches is strong brown extremely cobbly clay that is 25 percent cobbles, 15 percent stones, and 30 percent gravel. Volcanic tuff conglomerate is at a depth of 24 inches. In some areas the surface layer is loam, stony loam, or cobbly sandy loam. Depth to volcanic tuff conglomerate ranges from 20 to 30 inches.

Permeability of the Peckham soil is slow. Available water capacity is very low to low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 20 to 30 inches. Runoff is slow to medium, and the hazard of water erosion is slight to moderate.

The Cole Variant soil is very deep and moderately well drained. It formed in mixed alluvium derived dominantly from basic igneous rock. Typically, the surface layer is dark gray clay loam about 6 inches thick. The upper 12 inches of the subsoil is dark gray clay, and the lower 14 inches is dark gray clay loam. The substratum to a depth of 60 inches or more is light yellowish brown and olive yellow clay loam that has dark brown mottles. In some areas the surface layer is loam, silt loam, or clay.

Permeability of this Cole Variant soil is slow to a depth of 32 inches and very slow below this depth. Available water capacity is high. Effective rooting depth is 60 inches or more, but it is restricted by the dense substratum at a depth of about 30 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 36 to 48 inches in December through March.

This unit is used as rangeland and wildlife habitat.

The production of forage on the Peckham soil is limited by stones and cobbles on the surface and the very low to low available water capacity. The Cole Variant soil has few limitations. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. The Cole Variant soil responds to rangeland seeding and to proper grazing use. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of sufficient cover and browse. Springs and streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

The Peckham soil is in capability subclass VIe (15), nonirrigated, and the Cole Variant soil is in capability unit IIIe-3 (17), nonirrigated.

234—Pedcat loam, 0 to 2 percent slopes. This very deep, poorly drained soil is on low alluvial fans adjacent to the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. The microrelief is hummocky. The characteristic plant community is mainly spinescale saltbush, red brome, and alkali heath. Elevation is 80 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown loam about 2 inches thick. The subsurface layer is light brownish gray and light yellowish brown clay loam about 3 inches thick. The upper 18 inches of the subsoil is dark grayish brown over grayish brown and brownish yellow silty clay, and the lower 6 inches is light yellowish brown silty clay loam that has light brown mottles. The substratum to a depth of 60 inches or more is light yellowish brown over very pale brown clay loam. This soil is calcareous below a depth of 13 inches. It is saline-sodic throughout. In some areas the surface layer is clay loam.

Included in this unit are small areas of Pedcat clay, 0 to 2 percent slopes, severely eroded; Volta clay loam; Chateau clay, ponded; and Dosamigos clay loam, partially drained. Also included are small areas of Marcuse silty clay, Santanela loam, Triangle clay, and Britto clay loam in the lower lying areas and Chinvar loam in the higher lying areas. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Pedcat soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the

hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 36 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat. This unit can be used as habitat for waterfowl.

The production of forage on this unit is limited by the excess salts and sodium and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits. It is limited ma nly by a lack of adequate water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used as habitat for waterfowl, outlets should be provided to regulate the depth of the water. It is limited mainly by the excess salts and sodium and moderate shrink-swell potential. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Moderate shrink-swell potential and low load supporting capacity limit the ability of levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

This map unit is in capability subclass VIIw (17), nonirrigated.

235—Pedcat loam, 0 to 2 percent slopes, eroded. This very deep, poorly drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. The microrelief is hummocky. The characteristic plant community is mainly spinescale saltbush, red brome, and alkali heath. Elevation is 250 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is pale brown loam about 1 inch thick. The upper 3 inches of the subsoil is pale brown clay loam, the next 18 inches is brown over yellowish brown silty clay, and the lower 14 inches is light yellowish brown silty clay loam. The substratum to a depth of 60 inches or more is light yellowish brown clay loam that has very dark gray mottles in the upper part. This soil is calcareous below a depth of 13 inches. It is sodic throughout and generally is saline-sodic below the surface layer. In some areas the surface layer is clay loam or silty clay loam. The upper 25 to 75 percent of the surface layer has been lost through erosion.

Included in this unit are small areas of Vernalis loam, 2 to 5 percent slopes; Ballvar loam, 2 to 8 percent slopes; and Mollic Xerofluvents, channeled. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Pedcat soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is moderate. A seasonal high water table is at a depth of 18 to 36 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by excess salts and sodium and the eroded surface layer. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock grazing should be managed to protect the unit from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Proper livestock management helps to maintain plant vigor and provide for the needs of wi dlife.

This unit provides habitat for wildlife such as deer, rabbits, and doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIw (17), nonirrigated.

236—Pedcat clay loam, leveled, 0 to 2 percent slopes. This very deep, poorly drained soil is on low alluvial fans adjacent to the valley basin rim. It formed

in mixed alluvium derived dominantly from sedimentary rock. The vegetation in areas not cultivated is mainly annual grasses and forbs. Elevation is 70 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown, light brownish gray, and light yellowish brown clay loam about 5 inches thick. The upper 18 inches of the subsoil is dark grayish brown over grayish brown silty clay, and the lower 6 inches is light yellowish brown silty clay loam that has light brown mottles. The substratum to a depth of 60 inches or more is light yellowish brown over very pale brown clay loam. This soil is calcareous below a depth of 13 inches. It is saline-sodic throughout. In some areas the surface layer is clay.

Included in this unit are small areas of Volta clay loam, partially drained, and Dosamigos clay loam, partially drained. Also included are small areas of Britto clay loam, leveled, and Marcuse clay, leveled, in the lower lying areas; Chinvar loam in the higher lying areas; and Chateau clay, partially drained. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Pedcat soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 36 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly for irrigated pasture. It is also used for irrigated crops, mainly barley, oats, alfalfa, corn, and sugar beets. Some areas are used as wildlife habitat.

This unit is suited to hay and pasture. The main limitations are excess salts and sodium and wetness. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Irrigation water can be applied by the border or sprinkler methods. Water needs to be applied carefully to prevent the buildup of a high water table during the growing season. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. The concentration of salts and sodium in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil in this unit. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

If this unit is used for irrigated crops, the main limitations are excess salts and sodium, very slow permeability, and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

This unit provides habitat for wildlife such as pheasants and doves. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

237—Pedcat clay, 0 to 2 percent slopes, severely eroded. This very deep, poorly drained soil is on low alluvial fans adjacent to areas of the valley basin rim that are now intermittent drainageways. It formed in mixed alluvium derived dominantly from sedimentary rock. The microrelief is hummocky. The characteristic plant community is mainly spinescale saltbush, red brome, and alkali heath. Elevation is 80 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer has been lost through erosion. The upper 18 inches of the subsoil is dark grayish brown over grayish brown clay, and the lower 5 inches is light yellowish brown silty clay loam that has

light brown mottles. The substratum to a depth of 60 inches or more is light yellowish brown over very pale brown clay loam. The lower part of the subsoil and the substratum are calcareous. The soil is saline-sodic throughout. In some areas the upper part of the profile is clay loam.

Included in this unit are about 10 percent Volta clay loam and 15 percent Pedcat loam, 0 to 2 percent slopes, in the higher lying, noneroded areas. The percentage of included soils varies from one area to another.

Permeability of this Pedcat soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is high because of the concentration of runoff water. A seasonal high water table is at a depth of 18 to 36 inches in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by excess salts and sodium, low rainfall, and the hazard of erosion. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock grazing should be managed to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of adequate water and cover. San Luis Creek and small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by grasses and forbs. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

238—Pits. This map unit consists of open excavations, a strip mine, and a basalt rock quarry that contain soil material and rock. The strip mine, which is a source of agricultural gypsum, is 10 miles south of Los Banos, and the basalt rock quarry is on Basalt Hill. Included in the unit near O'Neil Forebay and the Dosamigos pumping plant are areas where loamy and fine textured soil material and shaly rock fragments have been dumped.

239—Pleito gravelly clay loam, 8 to 15 percent slopes. This very deep, well drained soil is on fans. It formed in colluvium and alluvium derived dominantly from sedimentary rock. Elevation is 260 to 400 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown gravelly clay loam about 18 inches thick. It is 15 to 25 percent gravel. The subsoil is pale brown clay loam about 6 inches thick. The upper 21 inches of the substratum is light yellowish brown gravelly clay loam, and the lower part to a depth of 60 inches or more is pale yellow gravelly sandy clay loam. The substratum is 15 percent gravel. It is calcareous throughout and has excess lime in the upper 21 inches. In some areas the surface layer is gravelly loam or loam.

Included in this unit is about 15 percent soils that are similar to this Pleito soil but have slopes of 5 to 8 percent and are in the lower lying areas. Also included are small areas of Pleito gravelly clay loam, 15 to 30 percent slopes, in the higher lying areas; Los Banos clay loam, 8 to 15 percent slopes, scattered throughout the unit; Paver clay loam, 2 to 5 percent slopes, on small alluvial fans; and soils that are similar to this Pleito soil but have less than 15 percent gravel in the surface layer and are in an area along Interstate 5, northwest of the junction with Highway 165. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Pleito soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

This unit is used for irrigated crops, mainly cotton and apricots, and for urban development.

This unit is suited to irrigated crops. It is limited mainly by excess lime and steepness of slope. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion.

Because of the steepness of slope, only sprinkler or trickle irrigation is suited to this unit. The method used generally is governed by the crop grown. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff. All tillage should be on the contour or across the slope. The excess lime in the substratum can cause iron chlorosis in some crops. Adding iron supplements can correct this condition.

If this unit is used for urban development, the main limitations are steepness of slope, moderately slow permeability, moderate shrink-swell potential, and

restricted load supporting capacity. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability units IIIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

240--Pleito gravelly clay loam, 15 to 30 percent slopes. This very deep, well drained soil is on terraces. It formed in alluvium derived dominantly from mixed sedimentary rock. The characteristic plant community is mainly soft chess and wild oat. Elevation is 400 to 700 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown gravelly clay loam about 11 inches thick. It is 20 percent gravel. The upper 12 inches of the subsoil is brown clay loam, and the lower 17 inches is yellowish brown clay loam. The subsoil is 7 percent gravel. The substratum to a depth of 60 inches or more is extremely gravelly clay loam. It is 75 percent gravel. This soil is calcareous to a depth of 40 inches. In some areas the surface layer is gravelly loam or is moderately eroded, and in some areas the profile is extremely gravelly below a depth of 25 inches.

Included in this unit are small areas of San Timoteo sandy loam, 15 to 30 slopes; Arburua loam, 15 to 30 percent slopes; and Oneil silt loam, 15 to 30 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Pleito soil is slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more but is restricted by the content of gravel at a depth of 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used as rangeland and wildlife habitat. A few areas are used for urban development.

This unit has few limitations for the production of forage. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

If this unit is used for urban development, the main limitations are steepness of slope, slow permeability, restricted load supporting capacity, and moderate shrink-swell potential. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Preserving the existing plant cover during construction helps to control erosion. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Buildings and roads should be designed to offset the limited ability of the soil to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability subclass VIe (17), nonirrigated.

241—Quinto-Illito-Rock outcrop complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Quinto soil is mainly California buckwheat, soft chess, and red brome, and on the Illito soil it is mainly filaree and soft chess. Elevation is 1,000 to 3,200 feet. The average annual precipitation is about 14 to 24 inches, the average

annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 30 percent Quinto gravelly sandy loam, 30 percent Illito extremely stony loam, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Quinto gravelly sandy loam, 50 to 75 percent slopes; Ararat extremely stony loam, 30 to 50 percent slopes; and Peckham cobbly loam, 30 to 50 percent slopes. Also included are small areas of soils that are similar to this Illito soil but have slopes of 50 to 75 percent and are near the North Fork of Los Banos Creek. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Quinto soil is shallow and somewhat excessively drained. It formed in material derived dominantly from basic volcanic rock. Typically, the surface layer is yellowish brown gravelly sandy loam about 6 inches thick. The subsoil is brown gravelly sandy clay loam about 11 inches thick. Basic volcanic rock is at a depth of 17 inches. This soil is 15 percent gravel throughout. In some areas the surface layer is sandy loam. Depth to basic volcanic rock ranges from 10 to 20 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion.

Permeability of the Quinto soil is moderately slow. Available water capacity is very low. Effective rooting depth is limited by basic volcanic rock at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Illito soil is very shallow and well drained. It formed in material derived dominantly from basic volcanic rock. Typically, the surface layer is dark brown extremely stony loam about 5 inches thick. It is 45 percent stones, cobbles, and gravel. The subsoil is dark brown very stony clay about 3 inches thick. It is 50 percent stones, cobbles, and gravel. Basic volcanic rock is at a depth of 8 inches. In some areas the surface layer is very cobbly loam. Depth to basic volcanic rock ranges from 5 to 10 inches.

Permeability of the Illito soil is very slow. Available water capacity is very low. Effective rooting depth is limited by basic volcanic rock at a depth of 5 to 10 inches. Runoff is rapid, and the hazard of water erosion is moderate.

Rock outcrop consists mainly of exposed areas of basic volcanic rock; however, in some places the rock is covered by a few inches of loamy or clayey soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope, very low available water capacity, and the areas of Rock outcrop. The Illito soil is also limited by stones on the surface, and the Quinto soil is limited by the eroded surface layer. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope and stones on the surface of the Illito soil limit access by livestock and result in overgrazing of the less sloping areas. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water and cover. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

242—Quinto-Millsholm-Rock outcrop complex, 40 to 75 percent slopes. This map unit is on mountains. The characteristic plant community on the Quinto soil is mainly California buckwheat, soft chess, and red brome, and on the Millsholm soil it is mainly filaree, soft chess, and foxtail fescue. Elevation is 600 to 3,400 feet. The average annual precipitation is about 13 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 35 percent Quinto gravelly sandy loam, 30 percent Millsholm loam, and 20 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to the Quinto and Millsholm soils but have slopes of 25 to 40 percent; Wisflat sandy loam, 50 to 75 percent slopes; Contra Costa loam, 50 to 65 percent slopes; and Honker sandy loam, 50 to 65 percent

slopes. Also included are small areas of soils that are similar to this Quinto soil but have a clayey subsoil and are mainly south of Sweeney Hill Road. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Quinto soil is shallow and somewhat excessively drained. It formed in material derived dominantly from sandstone conglomerate. Typically, the surface layer is yellowish brown gravelly sandy loam about 6 inches thick. The subsoil is brown gravelly sandy clay loam about 11 inches thick. Sandstone conglomerate is at a depth of 17 inches. This soil is 15 percent gravel throughout. In some areas the surface layer is sandy loam. Depth to sandstone conglomerate or fractured sandstone ranges from 10 to 20 inches. The upper 25 to 50 percent of the surface layer has been lost through erosion.

Permeability of the Quinto soil is moderately slow. Available water capacity is very low. Effective rooting depth is limited by sandstone conglomerate or fractured sandstone at a depth of 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very high.

The Millsholm soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale brown loam about 6 inches thick. It is 5 percent gravel. The subsoil is light yellowish brown loam about 13 inches thick. It is 10 percent angular gravel. Fractured sandstone is at a depth of 19 inches. In some areas the surface layer is sandy loam. Depth to sandstone or shale ranges from 15 to 20 inches.

Permeability of the Millsholm soil is moderate. Available water capacity is very low to low. Effective rooting depth is limited by sandstone or shale at a depth of 15 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope, very low to low available water capacity, and the areas of Rock outcrop. The Quinto soil is also limited by the eroded surface layer. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Steepness of slope limits access by livestock. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit is limited for livestock watering ponds and other water impoundments because of the steepness of slope. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

243—Quinto-Rock outcrop complex, 50 to 75 percent slopes. This map unit is on mountains. The characteristic plant community is mainly California buckwheat, soft chess, and red brome. Elevation is 500 to 3,300 feet. The average annual precipitation is about 13 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 50 percent Quinto gravelly sandy loam and 25 percent Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 15 percent soils that are similar to this Quinto soil but have a clayey subsoil and are mainly south of Sweeney Hill Road. Also included is a 100-acre area of soils that are similar to this Quinto soil but are 20 to 30 inches deep and are on the north side of Orligalita Ridge and small areas of Quinto gravelly sandy loam, 30 to 50 percent slopes; Wisflat sandy loam, 50 to 75 percent slopes; Millsholm loam, 40 to 75 percent slopes; and Illito extremely stony loam, 30 to 50 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Quinto soil is shallow and somewhat excessively drained. It formed in material derived dominantly from

sandstone conglomerate and fractured sandstone. Typically, the surface layer is yellowish brown gravelly sandy loam about 6 inches thick. The subsoil is brown gravelly sandy clay loam about 11 inches thick. Sandstone conglomerate is at a depth of 17 inches. This soil is 15 percent gravel throughout. Depth to sandstone conglomerate ranges from 10 to 20 inches. The upper 25 to 50 percent of the original surface layer has been lost through erosion. In some areas the surface layer is sandy loam.

Permeability of the Quinto soil is moderately slow. Available water capacity is very low. Effective rooting depth is limited by sandstone conglomerate or fractured sandstone at a depth of 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is very high.

Rock outcrop consists mainly of exposed areas of sandstone or conglomerate; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope, the eroded surface layer, the very low available water capacity, and the areas of Rock outcrop. Steepness of slope limits access by livestock. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

244—Rock outcrop-Ararat-Illito complex, 30 to 75 percent slopes. This map unit is on mountains. The characteristic plant community on the Ararat soil is mainly blue oak, soft chess, and wild oat with a total tree canopy of 40 to 50 percent, and on the Illito soil it is mainly filaree and soft chess. Elevation is 1,300 to 3,800 feet. The average annual precipitation is 15 to 24 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 60 percent Rock outcrop, 15 percent Ararat extremely stony loam, and 15 percent Illito extremely stony loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Franciscan sandy loam, 50 to 75 percent slopes; Laveaga sandy clay loam, 30 to 50 percent slopes; Laveaga sandy clay loam, 50 to 75 percent slopes; Peckham cobbly loam, 30 to 50 percent slopes; and soils that are similar to the Ararat soil but are moist 6 months of the year or more and are in springs and drainageways. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop consists mainly of exposed areas of basic volcanic rock; however, in some places the rock is covered by a few inches of loamy or clayey soil material. Runoff is very rapid.

The Ararat soil is deep and well drained. It formed in material derived dominantly from volcanic tuff conglomerate. Typically, 25 percent of the surface is covered with stones, boulders, and cobbles. The upper 7 inches of the surface layer is brown extremely stony loam that is 25 percent stones, boulders, and cobbles, and the lower 17 inches is reddish brown very stony loam that is 40 percent stones and cobbles. The subsoil is reddish brown extremely stony sandy clay loam about 21 inches thick. It is 65 percent stones and cobbles. Volcanic tuff conglomerate is at a depth of 45 inches. In some areas the surface layer is bouldery loam, loam, or bouldery sandy clay loam.

Permeability of the Ararat soil is moderately slow. Available water capacity is low. Effective rooting depth is limited by volcanic tuff conglomerate at a depth of 40 to 50 inches. Runoff is rapid, and the hazard of water erosion is moderate to high.

The Illito soil is very shallow and well drained. It formed in material derived dominantly from basic volcanic rock. Typically, the surface layer is dark brown extremely stony loam about 5 inches thick. It is 45 percent stones, cobbles, and gravel. The subsoil is dark brown very stony clay about 3 inches thick. It is 50 percent stones, cobbles, and gravel. Basic volcanic rock is at a depth of 8 inches. Depth to basic volcanic rock ranges from 5 to 10 inches. In some areas the surface layer is very cobbly loam.

Permeability of the Illito soil is very slow. Available water capacity is very low. Effective rooting depth is limited by basic volcanic rock at a depth of 5 to 10

inches. Runoff is rapid, and the hazard of water erosion is moderate to high.

This unit is used as wildlife habitat and watershed.

This unit provides habitat for wildlife such as deer, wild pigs, doves, and quail. The very shallow depth of the Illito soil, the areas of Rock outcrop, steepness of slope, and a lack of sufficient water are the main limitations.

This map unit is in capability subclass VIIe (15), nonirrigated.

245—Rock outcrop-Wisflat complex, 30 to 75 percent slopes. This map unit is on foothills. The characteristic plant community is mainly red brome, soft chess, California sagebrush, and California buckwheat. Elevation is 600 to 2,100 feet. The average annual precipitation is about 12 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 190 to 240 days.

This unit is 55 percent Rock outcrop and 30 percent Wisflat sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Arburua loam, 30 to 50 percent slopes, and Franciscan sandy loam, 30 to 50 percent slopes, on north-facing slopes. Also included are small areas of Conosta clay loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 3 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 13 inches, is strongly weathered, fractured shale. Hard, fractured shale is at a depth of 13 inches. This soil is calcareous to a depth of 11 inches, and it has excess lime between depths of 3 and 11 inches. Depth to weathered shale or sandstone ranges from 10 to 15 inches. In some areas there is no lime in the soil. The upper 75 to 100 percent of the original surface layer has been lost through erosion. In some areas the surface layer is loam or gravelly sandy loam.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered shale or sandstone at a depth of 10 to 15 inches. Runoff is rapid, and the hazard of water erosion is high to very high.

This unit is used as wildlife habitat and watershed.

This unit provides habitat for wildlife such as deer and doves. The main limitations are a lack of sufficient water, the shallow depth of the Wisflat soil, the areas of Rock outcrop, and steepness of slope.

This map unit is in capability subclass VIIe (15), nonirrigated.

246—San Emigdio fine sandy loam. This very deep, well drained soil is on high flood plains, in streambank overflow areas, and on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community in areas not cultivated is mainly soft chess and filaree. Elevation is 110 to 800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

Typically, the surface layer is light yellowish brown fine sandy loam about 17 inches thick. The upper 15 inches of the underlying material is brownish yellow fine sandy loam, the next 21 inches is yellow fine sandy loam, and the lower part to a depth of 60 inches or more is yellow loam. This soil is calcareous below a depth of 5 inches. In some areas the surface layer is sandy loam or clay loam.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes; Woo clay loam, 0 to 2 percent slopes; and Stanislaus clay loam. Also included are small areas of San Timoteo sandy loam, 2 to 8 percent slopes, in the higher lying areas. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this San Emigdio soil is moderately rapid. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used as rangeland. A few areas are used for irrigated crops and wildlife habitat.

This unit has few limitations for the production of forage. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces the risk of ditch erosion.

If this unit is used for urban development, the main limitation is the risk of seepage. If the density of housing is moderate to high, community sewage systems may be needed.

This unit provides habitat for wildlife such as rabbits and doves. It is limited mainly by a lack of sufficient water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability class I (17), irrigated, and capability subclass IVc (17), nonirrigated.

247—San Emigdio loam. This very deep, well drained soil is on alluvial fans and in streambank overflow areas. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 110 to 170 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light yellowish brown loam about 14 inches thick. The upper 9 inches of the underlying material is light yellowish brown loam, the next 16 inches is light yellowish brown silt loam, and the lower part to a depth of 60 inches or more is light yellowish brown loam. This soil is calcareous throughout. In some areas the surface layer is sandy loam, fine sandy loam, or clay loam.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes; Woo clay loam, 0 to 2 percent slopes; and Stanislaus clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this San Emigdio soil is moderately rapid. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly walnuts, almonds, beans, and peas. Among the other crops grown are tomatoes and alfalfa. Some areas are used for homesite development.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces the risk of ditch erosion.

If this unit is used for homesite development, the main limitation is the risk of seepage. If the density of housing is moderate to high, community sewage systems may be needed.

This map unit is in capability class I (17), irrigated, and capability subclass IVc (17), nonirrigated.

248—Santanela loam. This very deep, very poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community is mainly saltgrass and iodinebush. Elevation is 90 to 100 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light brownish gray loam about 3 inches thick. It has brown and very pale brown mottles. The subsurface layer is pale brown loam about 3 inches thick. It has strong brown mottles. The upper 4 inches of the subsoil is grayish brown clay loam that has strong brown and light yellowish brown mottles, the next 4 inches is brown clay loam that has dark gray and brownish yellow mottles when moist, and the lower 5 inches is brown loam that has brownish yellow mottles when moist. The upper 14 inches of the substratum is brown loam that has dark brown mottles when moist, the next 14 inches is pale brown sandy loam, and the lower part to a depth of 60 inches or more is grayish brown loam that has yellowish brown mottles. This soil is calcareous below a depth of 3 inches. The subsoil is saline-sodic, and the substratum

is saline or saline-sodic. In some areas the surface layer is sandy loam or clay loam.

Included in this unit is about 10 percent Triangle clay and Triangle clay, sodic, in the lower lying areas. Also included are small areas of Turlock sandy loam; Britto clay loam; Elnido sandy loam, wet; Marcuse silty clay; and Pedcat loam, 0 to 2 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Santanela soil is slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through April.

This unit is used mainly as wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as wetland wildlife habitat. It is limited mainly by the excess salts and sodium and moderate shrink-swell potential. Species that are tolerant of wet, saline, and sodic conditions should be selected for planting. Saltgrass, Baltic rush, jointgrass, and spikerush provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable vegetation can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of vegetation more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

The production of forage on this unit is limited by excess sodium and salts and the periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

249—San Timoteo sandy loam, 2 to 8 percent slopes. This moderately deep, well drained soil is on low foothills. It formed in material derived dominantly from calcareous sandstone and shale. The characteristic plant community is mainly soft chess, wild oat, and filaree. Elevation is 400 to 600 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

Typically, the surface layer is pale brown sandy loam about 16 inches thick. The underlying material, to a depth of 32 inches, is light yellowish brown over pale brown sandy loam. Strongly weathered, calcareous sandstone is at a depth of 32 inches. This soil is calcareous throughout, and it has excess lime below a depth of 7 inches. Depth to weathered sandstone or shale ranges from 20 to 40 inches. In some areas the surface layer is fine sandy loam or gravelly sandy loam.

Included in this unit is about 10 percent soils that are similar to this San Timoteo soil but are 40 to 50 inches deep to strongly weathered sandstone. Also included are small areas of Chaqua loam, 2 to 8 percent slopes; San Timoteo sandy loam, 8 to 15 percent slopes; and Bapos clay loam, 2 to 8 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this San Timoteo soil is moderately rapid. Available water capacity is low to moderate. Effective rooting depth is limited by weathered sandstone or shale at a depth of 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by the low to moderate available water capacity. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to

protect the soil from erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (15), nonirrigated.

250—San Timoteo-Wisflat sandy loams complex, 8 to 15 percent slopes. This map unit is on low foothills. The characteristic plant community on the San Timoteo soil is mainly soft chess, wild oat, and filaree, and on the Wisflat soil it is mainly red brome and soft chess. Elevation is 300 to 1,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 50 percent San Timoteo sandy loam and 40 percent Wisflat sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Wisflat sandy loam, 15 to 30 percent slopes; San Timoteo sandy loam, 2 to 8 percent slopes; San Timoteo sandy loam, 15 to 30 percent slopes; and Arburua loam, 15 to 30 percent slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The San Timoteo soil is moderately deep and well drained. It formed in material derived dominantly from calcareous sandstone and shale. Typically, the surface layer is pale brown sandy loam about 16 inches thick. The underlying material, to a depth of 32 inches, is light yellowish brown over pale brown sandy loam. Strongly weathered, calcareous sandstone is at a depth of 32 inches. This soil is calcareous throughout, and it has excess lime below a depth of 7 inches. Depth to weathered sandstone or shale ranges from 20 to 40 inches. In some areas the surface layer is fine sandy loam or gravelly sandy loam.

Permeability of the San Timoteo soil is moderately rapid. Available water capacity is low to moderate. Effective rooting depth is limited by weathered sandstone or shale at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 6 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 16 inches, is strongly weathered, fractured sandstone. Hard sandstone is at a depth of 16 inches. This soil is calcareous throughout, and it has excess lime below a depth of 6 inches. Depth to weathered sandstone or shale ranges from 10 to 20 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion. In some areas the surface layer is loam.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered sandstone or shale at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by the low to moderate available water capacity of the San Timoteo soil and by the eroded surface layer and very low available water capacity of the Wisflat soil. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and to proper grazing use. The main limitations are a shortage of water in years of below normal rainfall and shallow soil depth in some areas. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide

important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

251—San Timoteo-Wisflat sandy loams complex, 15 to 30 percent slopes. This map unit is on low foothills. The characteristic plant community on the San Timoteo soil is mainly soft chess, wild oat, and filaree, and on the Wisflat soil it is mainly red brome and soft chess. Elevation is 450 to 1,200 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 50 percent San Timoteo sandy loam and 40 percent Wisflat sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rock outcrop; Wisflat sandy loam, 8 to 15 percent slopes; San Timoteo sandy loam, 8 to 15 percent slopes; and Arburua loam, 15 to 30 percent slopes. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

The San Timoteo soil is moderately deep and well drained. It formed in material derived dominantly from calcareous sandstone and shale. Typically, the surface layer is pale brown sandy loam about 16 inches thick. The underlying material to a depth of 32 inches is light yellowish brown over pale brown sandy loam. Strongly weathered, calcareous sandstone is at a depth of 32 inches. This soil is calcareous throughout, and it has excess lime below a depth of 7 inches. Depth to weathered sandstone or shale ranges from 20 to 40 inches. In some areas the surface layer is fine sandy loam or gravelly sandy loam.

Permeability of the San Timoteo soil is moderately rapid. Available water capacity is low to moderate. Effective rooting depth is limited by weathered sandstone or shale at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 6 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 16 inches, is strongly weathered, fractured sandstone. Hard sandstone is at a depth of 16 inches. This soil is calcareous throughout, and it has excess lime below a depth of 6 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to weathered sandstone or shale ranges from 10 to 20 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered sandstone or shale at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the restricted available water capacity, the hazard of erosion, and the eroded surface layer of the Wisflat soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. This unit responds to rangeland seeding and to proper grazing use. The main limitations are a shortage of water in years of below normal rainfall and shallow soil depth in some areas. Mechanical treatment should be avoided in the steeper areas. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

252—Sehorn-Contra Costa complex, 30 to 50 percent slopes. This map unit is on mountains. The characteristic plant community on the Sehorn soil is mainly soft chess, wild oat, filaree, and burclover, and on the Contra Costa soil it is mainly soft chess, wild oat, and filaree. Elevation is 600 to 1,900 feet. The average annual precipitation is about 15 to 20 inches, the average annual air temperature is 59 to 62 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 50 percent Sehorn clay and 35 percent Contra Costa clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Millsholm loam, 30 to 50 percent slopes, and soils that are similar to this Sehorn soil but are 40 to 60 inches deep to bedrock and are on north-facing slopes. Also included are small areas of Ayar clay, 30 to 50 percent slopes, and Conosta clay loam, 30 to 50 percent slopes, in the lower lying areas. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Sehorn soil is moderately deep and well drained. It formed in material derived dominantly from shale and sandstone. Typically, the surface layer is yellowish brown clay about 7 inches thick. The underlying material to a depth of 26 inches is yellowish brown over light yellowish brown and strong brown clay. Fractured shale and sandstone are at a depth of 26 inches. Depth to fractured shale and sandstone ranges from 23 to 40 inches. When dry this soil has cracks that extend to a depth of 20 inches and are as wide as 2 inches at the surface. In some areas the surface layer is silty clay loam or clay loam.

Permeability of the Sehorn soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by fractured shale or sandstone at a depth of 23 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

The Contra Costa soil is moderately deep and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is brown and yellowish brown loam about 19 inches thick. The upper 13 inches of the subsoil is brown clay loam that is 5 percent gravel, and the lower 7 inches is brown clay loam and strongly weathered shale that crushes to clay loam. Fractured shale is at a depth of 39 inches. In some areas the surface layer is clay loam. Depth to fractured shale or sandstone ranges from 20 to 40 inches.

Permeability of the Contra Costa soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by fractured shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. If the soil in this unit is grazed by livestock when it is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Areas of this unit are difficult to fence. Excessive shrinking and swelling of the soil cause fenceposts to be lifted out of the ground. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water, cover, and browse. Small springs and intermittent streams provide water. Livestock watering facilities and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

253—Stanislaus clay loam. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 90 to 300 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark grayish brown over dark brown clay loam about 19 inches thick. The subsoil is dark brown over brown clay about 20 inches thick. The substratum to a depth of 60 inches or more is calcareous, yellowish brown and dark yellowish brown clay loam. In some areas the surface layer is clay.

Included in this unit is about 10 percent soils that are similar to this Stanislaus soil but have 60 to 70 percent clay in the subsoil. Also included are small areas of Woo clay loam, 0 to 2 percent slopes; Woo clay, 0 to 2 percent slopes; Dosamigos clay, partially drained; Dosamigos clay loam, partially drained; Capay clay; Apollo clay loam, 2 to 8 percent slopes; and Damluis clay loam, 0 to 2 percent slopes. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Stanislaus soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly beans, cotton, walnuts, alfalfa, sugar beets, corn, peas, tomatoes, and cantaloup. Among the other crops grown are peppers, barley, squash, and watermelon. The unit is also used for irrigated pasture. Some areas are used for urban development.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for urban development, the main limitations are the slow permeability, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIs-3 (17), irrigated, and IVs-3 (17), nonirrigated.

254—Stanislaus clay loam, wet. This very deep, somewhat poorly drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 70 to 150 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 16 inches thick. The subsoil is brown and light yellowish brown clay about 18 inches thick. The upper 16 inches of the substratum is light yellowish brown clay, and the lower part to a depth of 60 inches or more is very pale brown clay loam. The substratum has black mottles and is calcareous. In some areas the surface layer is clay.

Included in this unit is about 10 percent Stanislaus clay loam. Also included are small areas of Woo clay loam, 0 to 2 percent slopes; Woo sandy clay loam, 0 to 2 percent slopes; Woo loam, 0 to 2 percent slopes; Damluis clay loam, 0 to 2 percent slopes; Dosamigos clay loam, partially drained; Dosamigos clay, partially drained; Woo clay loam, wet, 0 to 2 percent slopes; and Woo clay, 0 to 2 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Stanislaus soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 54 to 60 inches in April through October.

Most areas of this unit are used for irrigated crops, mainly alfalfa, sugar beets, cotton, beans, and corn. Among the other crops grown are walnuts. Some areas are used for urban development.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability and wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant

nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops.

If this unit is used for urban development, the main limitations are the slow permeability, wetness, restricted load supporting capacity, and high shrink-swell potential. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIw-3 (17), irrigated, and IVw-3 (17), nonirrigated.

255—Stanislaus-Dosamigos-Urban land complex. This map unit is on low alluvial fans. Slope is 0 to 2 percent. Elevation is 90 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 30 percent Stanislaus clay loam, 15 percent Dosamigos clay, partially drained, and 40 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Stanislaus clay loam, wet, in the Gustine area. Also included are small areas of Woo clay loam, 0 to 2 percent slopes, and Woo clay, 0 to 2 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Stanislaus soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is dark grayish brown over dark brown clay loam about 19 inches thick. The subsoil is dark brown over brown clay about 20 inches thick. The substratum to a depth of 60 inches or more is calcareous, yellowish brown and dark yellowish brown clay loam. In some areas the surface layer is clay.

Permeability of the Stanislaus soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The Dosamigos soil is very deep and somewhat poorly drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is dark grayish brown clay about 15 inches thick. The upper 5 inches of the subsoil is dark grayish brown clay, and the lower 7 inches is olive brown and dark grayish brown clay. The upper 7 inches of the substratum is light olive brown clay loam, and the lower part to a depth of 60 inches or more is yellowish brown and olive yellow clay loam. This soil is calcareous below a depth of 5 inches. It is saline below a depth of 15 inches. In some areas the surface layer is clay loam.

Permeability of the Dosamigos soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through March. This soil is subject to brief periods of ponding after prolonged storms in December through March.

Urban land consists of areas covered by streets, parking lots, and buildings.

This unit is used for urban and recreational development, including buildings, yards, parks, playgrounds, streets, and parking lots.

If this unit is used for windbreaks and environmental plantings, the main limitations are wetness, salinity, and the clay texture of the surface layer of the Dosamigos soil. Supplemental irrigation may be needed when planting and during dry periods.

If this unit is used for parks and playgrounds, the main limitations are the restricted permeability of the soils and the clay texture of the surface layer in the Dosamigos soil.

If this unit is used for urban development, the main limitations are the restricted permeability, restricted load supporting capacity, and high shrink-swell potential. The Dosamigos soil is also limited by wetness. If this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the restricted permeability. During the rainy season, however, there is still a possibility of failure of absorption fields. If drainage outlets are available, tile drains can be placed around the

perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Buildings and roads should be designed to offset the limited ability of the soils in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIs-3 (17), irrigated, and IVs-3 (17), nonirrigated.

256—Triangle clay. This very deep, very poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The characteristic plant community is mainly alkali heath, swampgrass, knotgrass, spikerush, and iodinebush. Elevation is 70 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is olive gray and dark gray clay about 34 inches thick. It has olive, light gray, and black mottles. The underlying material to a depth of 60 inches or more is pale yellow over very pale brown clay loam that has yellowish brown mottles. This soil is calcareous throughout, and it has excess lime below a depth of 34 inches. The soil is saline-sodic below a depth of 15 inches. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 3 inches at the surface. In some areas the surface layer is clay loam or silty clay.

Included in this unit are small areas of Turlock sandy loam, Santanela loam, and Turmound sandy loam on small mounds; Triangle clay, sodic; Britto clay loam; Volta clay loam; Marcuse silty clay; Marcuse clay, leveled; and Agnal clay loam. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Triangle soil is very slow. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through May.

This unit is used mainly for wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as habitat for wetland wildlife. It is limited mainly by excess salts and high shrink-swell potential. Species that are tolerant of wetness and salinity should be selected for planting. Swamp timothy, jointgrass, spikerush, and alkali bulrush provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable plants can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. The high shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of vegetation more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

The production of forage on this unit is limited by excess salts and the periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

257—Triangle clay, sodic. This very deep, very poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community is mainly swampgrass and alkali heath. Elevation is 80 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 3 inches of the surface layer is grayish brown clay and the lower 10 inches is grayish

brown clay that has dark brown mottles when moist. The upper 17 inches of the underlying material is grayish brown clay that has dark brown mottles when moist, and the lower part to a depth of 60 inches or more is light brownish gray silty clay. This soil is saline-sodic throughout. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 3 inches at the surface. In some areas the surface layer is silty clay or clay loam.

Included in this unit are small areas of Triangle clay and Agnal clay loam. Also included are small areas of Britto clay loam; Checker loam; Kesterson loam, ponded; Santanela loam; Turlock sandy loam; and Marcuse silty clay in the higher lying areas. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Triangle soil is very slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through May.

This unit is used mainly for wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as habitat for wetland wildlife. It is limited mainly by the excess salts and sodium and the high shrink-swell potential. Species that are tolerant of wet, saline, and sodic conditions should be selected for planting. Swamp timothy, jointgrass, spikerush, alkali bulrush, and Baltic rush provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the water in Volta Reservoir, the depth of the ponded water, and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable vegetation can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. High shrink-swell potential and low load supporting capacity limit the ability of the levees to contain water and to support loads. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of vegetation more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

The production of forage on this unit is limited by excess sodium and salts and the periods of inundation. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

258—Trulae silty clay, partially drained. This very deep, somewhat poorly drained soil is in the valley basin. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 80 to 90 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 6 inches of the surface layer is grayish brown silty clay and the lower 4 inches is dark grayish brown silty clay. The upper 5 inches of the underlying material is brown silty clay that has gray mottles, the next 30 inches is brown clay, and the lower part to a depth of 60 inches or more is light brownish gray clay loam. This soil is calcareous throughout. It is sodic below a depth of 15 inches and is saline throughout. When dry, this soil has cracks that extend to a depth of 20 inches and are as wide as 3 inches at the surface.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes; Triangle clay; Triangle clay, sodic; Turlock loam, leveled; and Volta clay loam. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Trulae soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 48 to 60 inches in December through March. This unit is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used for irrigated crops, mainly alfalfa, barley, and sugar beets.

This unit is suited to irrigated crops. It is limited mainly by wetness, excess salts and sodium, and very slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the very slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies. Content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil in this unit. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

This map unit is in capability unit IIIw-5 (17), irrigated, and capability subclass VIw (17), nonirrigated.

259—Tunehill-Quiensabe complex, 30 to 50 percent slopes. This map unit is on dissected terraces. The characteristic plant community on the Tunehill soil is mainly soft chess, filaree, red brome, and foxtail fescue, and on the Quiensabe soil it is mainly soft chess, wild oat, and blue oak with a total tree canopy of 10 to 25 percent. Elevation is 1,200 to 1,500 feet. The average annual precipitation is about 15 to 20 inches, the average annual air temperature is 59 to 63 degrees F, and the average frost-free period is 200 to 230 days.

This unit is 45 percent Tunehill loam and 40 percent Quiensabe clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent soils that are similar to this Quiensabe soil but are clayey throughout the profile, develop wide cracks when dry, and are in gently sloping areas. Also included are small areas of Quiensabe sandy clay loam, 30 to 50 percent slopes, and Honker sandy loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Tunehill soil is shallow and well drained. It formed in mixed consolidated alluvium derived dominantly from basic igneous rock. Typically, the surface layer is brown loam about 7 inches thick. The subsoil is brown loam about 4 inches thick. It is 5 percent fragments of soft, cemented sediment. White, soft, consolidated volcanic sediment is at a depth of 11 inches. Depth to consolidated volcanic sediment ranges from 10 to 15 inches. In some areas depth to consolidated sediment is 5 to 10 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion. In some areas the surface layer is gravelly loam.

Permeability of the Tunehill soil is moderate. Available water capacity is very low. Effective rooting depth is limited by consolidated volcanic sediment at a depth of 10 to 15 inches. Runoff is rapid, and the hazard of water erosion is high.

The Quiensabe soil is moderately deep and well drained. It formed in alluvium derived dominantly from basic igneous rock. Typically, the surface layer is dark grayish brown gravelly clay loam about 5 inches thick. The subsoil is dark brown clay loam about 21 inches thick. The substratum is light olive brown and grayish brown gravelly clay loam about 8 inches thick. It is 15 percent gravel. Very pale brown, consolidated volcanic sediment is at a depth of 34 inches. Depth to consolidated volcanic sediment ranges from 20 to 40 inches. In some areas the surface layer is loam.

Permeability of the Quiensabe soil is slow. Available water capacity is low to moderate. Effective rooting depth is limited by consolidated volcanic sediment at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by slope and by the eroded surface layer and very low available water capacity of the Tunehill soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of

erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. If the soil in this unit is grazed by livestock when the soil is moist, trampling of the surface compacts the soil and uproots plants. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer and wild pigs. It is limited mainly by a lack of adequate water. Small springs and intermittent streams provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

260—Turlock sandy loam. This very deep, very poorly drained soil is on the valley basin rim and on low alluvial fans. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky. The characteristic plant community is mainly saltgrass, annual barley, and iodinebush. Elevation is 70 to 110 feet. The average precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown sandy loam about 3 inches thick. The subsurface layer is olive gray loam about 1 inch thick. It has light olive brown mottles. The upper 7 inches of the subsoil is olive gray clay loam that has yellowish brown mottles, and the lower 25 inches is olive gray over grayish brown clay loam that has black, olive, yellow, and very dark gray mottles. The upper 19 inches of the substratum is grayish brown clay loam that has olive yellow mottles, and the lower part to a depth of 60 inches or more is pale yellow silty clay loam that has yellowish brown mottles. This soil is calcareous below a depth of 25 inches, and it has excess lime below a depth of 36 inches. The soil is saline-sodic below a depth of 11 inches. In some areas the surface layer is fine sandy loam, loam, or clay loam.

Included in this unit are small areas of Triangle clay and Triangle clay, sodic, along channels, and Edminster loam and Kesterson sandy loam in the slightly higher lying areas. Also included are small areas of Kesterson loam, ponded; Kesterson sandy loam, ponded; Britto clay loam; Santanela loam; and Agnal clay loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Turlock soil is very slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through April.

This unit is used mainly for wetland wildlife habitat. It is also used as rangeland.

This unit is suited to use as habitat for wetland wildlife. It is limited mainly by the excess salts and sodium and moderate shrink-swell potential. Species that are tolerant of wet, saline, and sodic conditions should be selected for planting. Spikerush, alkali bulrush, swamp timothy, and jointgrass provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable vegetation can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. If fields are leveled for ponds, some natural mounds should be left within the pond area. These mounds serve as drier resting ground and nesting areas for waterfowl. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant cover and encouraging growth of vegetation more

attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

The production of forage on this unit is limited by excess sodium and salts, low rainfall, the periods of inundation, and low available water capacity. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This map unit is in capability subclass VIIw (17), nonirrigated.

261—Turlock loam, leveled. This very deep, very poorly drained soil is on the valley basin rim and low alluvial fans. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The characteristic plant community in areas not cultivated is mainly saltgrass, annual barley, and iodinebush. Elevation is 70 to 100 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown loam about 3 inches thick. It has light olive brown mottles. The upper 7 inches of the subsoil is olive gray clay loam that has yellowish brown mottles, and the lower 25 inches is olive gray over grayish brown clay loam that has black, olive, yellow, and very dark gray mottles. The upper 19 inches of the substratum is pale yellow clay loam that has olive yellow mottles, and the lower part to a depth of 60 inches or more is pale yellow silty clay loam that has yellowish brown mottles. This soil is calcareous below a depth of 10 inches, and it has excess lime below a depth of 35 inches. The soil is saline-sodic below a depth of 10 inches. In some areas the surface layer is clay loam or sandy loam.

Included in this unit are about 20 percent soils that are similar to this Turlock soil but the surface layer and subsoil have been mixed thoroughly and 15 percent Turlock sandy loam. Also included are small areas of Triangle clay. Included areas make up about 40 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Turlock soil is very slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is ponded, and the hazard of water erosion is slight. Water applied for wetland wildlife habitat is 12 inches above the surface to a depth of 18 inches below the surface in September through April.

This unit is used mainly for irrigated pasture. It is also used for wetland wildlife habitat.

This unit is suited to irrigated pasture. The main limitations are excess salts and sodium, the very slow permeability, and wetness. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Irrigation water can be applied by the border or sprinkler methods. Water needs to be applied carefully to prevent the buildup of a high water table during the growing season. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. The concentration of salts and sodium in the lower part of the subsoil limits the production of plants suitable for pasture. Leaching the salts is limited by the high water table. Drainage and proper irrigation water management help to reduce the concentration of salts. Salt-tolerant species are most suitable for planting. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

This unit is suited to use as habitat for wetland wildlife. It is limited mainly by the content of salts and sodium and the moderate shrink-swell potential. Species that are tolerant of wet, saline, and sodic conditions should be selected for planting. Watergrass, spikerush, alkali bulrush, and swamp timothy provide food, cover, and nesting habitat for waterfowl. The plant species present may vary, depending on the depth of the ponded water and the periods of inundation. Proper water management encourages growth of desirable plants and discourages growth of undesirable plants. Small areas of undesirable vegetation can be controlled effectively by mechanical and chemical methods. Where waterfowl are nesting, it is important to maintain a stable water level in spring. Low, wide pond levees appear most natural, resist wave cutting, and provide the best roadbed. Water supplies must be adequate and of proper quality to prevent the buildup of toxic salts in the soil. Water in inundated ponds should be regulated to prevent increased toxicity by salts, stagnation, and the development of conditions that can be harmful to waterfowl. Drainage water should be disposed of properly to maintain the quality of water supplies.

Livestock generally should be excluded from the areas used as wetland wildlife habitat by fencing; however, livestock grazing can be used to achieve specific objectives, such as reducing residual plant

cover and encouraging growth of vegetation more attractive to waterfowl. Grazing should be deferred from April 1 to July 1.

This map unit is in capability subclasses VIw (17), irrigated, and VIIw (17), nonirrigated.

262—Turmound sandy loam. This very deep, poorly drained soil is in higher lying, ponded areas of the valley basin. It formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The microrelief is hummocky. The characteristic plant community is mainly saltgrass, Baltic rush, rabbitfootgrass, and iodinebush. Elevation is 70 to 80 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray over gray sandy loam about 13 inches thick. The upper 7 inches of the subsoil is grayish brown and dark grayish brown sandy clay loam, and the lower 10 inches is brown and pale brown sandy clay loam that has light olive brown mottles when moist. The upper 8 inches of the substratum is grayish brown sandy clay loam that has brownish yellow and white mottles, and the lower part to a depth of 60 inches or more is light brownish gray clay that has olive yellow and white mottles. This soil is calcareous below a depth of 20 inches. It is saline-sodic throughout. In some areas the surface layer is loamy sand.

Included in this unit are small areas of Triangle clay and Turlock sandy loam in the higher lying areas. The percentage varies from one area to another.

Permeability of this Turmound soil is slow. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 30 inches in September through March. This soil is subject to brief periods of ponding after prolonged storms in December through February.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the content of salts and sodium and low rainfall. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and rabbits and for waterfowl during the part of the year when the soil is ponded. It is limited mainly by a lack of adequate food. The dense saltgrass and the small amount of little barley provide cover but little food for waterfowl.

This map unit is in capability subclass VIIw (17), nonirrigated.

263—Vernalis loam, 2 to 5 percent slopes. This very deep, well drained soil is on alluvial fans and flood plains. It formed in mixed alluvium derived dominantly from sedimentary rock. The characteristic plant community is mainly soft chess and foxtail barley. Elevation is 500 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days

Typically, the surface layer is light yellowish brown loam about 7 inches thick. The subsoil is yellowish brown over light yellowish brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is yellowish brown silty clay loam. This soil is calcareous below a depth of 7 inches. In some areas the surface layer is clay loam.

Included in this unit are about 10 percent soils that are similar to this Vernalis soil but have slopes of 0 to 2 percent and small areas of Balvar loam, 2 to 8 percent slopes. Also included are small areas of Pedcat loam, 2 to 5 percent slopes, eroded, that occur as slick spots. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Vernalis soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

This unit has few limitations for the production of forage. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, doves, and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food,

and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (17), nonirrigated.

264—Vernalis-Pedcat, eroded complex, 2 to 5 percent slopes. This map unit is on alluvial fans and flood plains. The characteristic plant community on the Vernalis soil is mainly soft chess and foxtail barley, and on the Pedcat soil it is mainly spinescale saltbush, red brome, and alkali heath. Elevation is 500 to 1,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 45 percent Vernalis loam and 25 percent Pedcat loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 25 percent soils that are similar to this Vernalis soil but are clayey and have excess lime throughout; these soils are in a 410-acre area near Carrisalito Spring, and in a 180-acre area in the Little Panoche Valley, near the Fresno County line. Also included are small areas of Ballard loam, 2 to 8 percent slopes. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Vernalis soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is light yellowish brown loam about 7 inches thick. The subsoil is yellowish brown over light yellowish brown clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is yellowish brown silty clay loam. This soil is calcareous below a depth of 7 inches. In some areas the surface layer is clay loam.

Permeability of the Vernalis soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The Pedcat soil is very deep and poorly drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is pale brown loam about 1 inch thick. The upper 3 inches of the subsoil is pale brown clay loam, the next 18 inches is brown over yellowish brown silty clay, and the lower 14 inches is light yellowish brown silty clay loam. The substratum to a depth of 60 inches or more is light yellowish brown clay loam that has very dark gray mottles in the upper part. This soil is calcareous below a depth of 13 inches. It is sodic throughout and generally is saline-sodic below the surface layer. The upper 25 to 75 percent of the surface layer has been lost through erosion. In some areas the surface layer is clay loam or silty clay loam.

Permeability of the Pedcat soil is very slow. Available water capacity is moderate. Runoff is very slow, and the hazard of water erosion is moderate. A seasonal high water table is at a depth of 18 to 36 inches in December through March. This soil is subject to brief periods of ponding after prolonged storms in December through March.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The Vernalis soil has few limitations for the production of forage. The Pedcat soil is limited by excess salts and sodium and the eroded surface layer. Grazing should be delayed until the soils are firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Livestock grazing should be managed to protect the unit from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, doves, and rabbits. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVe-1 (17), nonirrigated.

265—Volta clay loam. This deep, poorly drained soil is on low alluvial fans on the valley basin rim. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community is mainly saltgrass, annual barley, alkali sacaton, and alkali heath. Elevation is 80 to 110 feet. The average annual precipitation is about 9 to 12

inches, the average annual air temperature is about 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light gray clay loam about 1 inch thick. The upper 3 inches of the subsoil is grayish brown clay loam, the next 7 inches is pale brown clay loam, and the lower 15 inches is very pale brown clay loam that has gray mottles. The upper 20 inches of the substratum is gray and very pale brown clay loam, and the lower part to a depth of 60 inches or more is a silica-cemented hardpan. The hardpan is light gray, gray, and pale brown clay loam that is 20 percent durinodes and has greenish gray mottles when moist. This soil is calcareous throughout, and it has excess lime between depths of 1 and 4 inches. It is sodic or saline-sodic below a depth of 1 inch. In some areas the surface layer is loam or clay. Depth to the hardpan ranges from 45 to 55 inches. In some areas the subsoil is clay.

Included in this unit are small areas of Pedcat loam, 0 to 2 percent slopes, and Pedcat clay, 0 to 2 percent slopes, severely eroded, in the higher lying areas. Also included are small areas of Marcuse silty clay and Triangle clay in the lower lying areas. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Volta soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 45 to 55 inches. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 12 to 36 inches in December through March; however, many areas are inundated in some years because of water encroaching from ponded areas and stream overflow.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by excess salts and sodium. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as rabbits and doves and for waterfowl during the part of the year when the soil is ponded. Small ponds provide important habitat elements such as water, food, and cover in areas otherwise dominated by grasses and forbs.

If this unit is prepared for a use that requires deep ripping into the hardpan, drainage should be provided before the ripping is done. This prevents the water table from rising to the surface or near it.

This map unit is in capability subclass VIIw (17), nonirrigated.

266—Volta clay loam, partially drained. This deep, poorly drained soil is on low alluvial fans on the valley basin rim. Drainage has been improved through the use of tile drains. This soil formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 90 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is light brownish gray clay loam about 6 inches thick (fig. 6). The upper 9 inches of the subsoil is grayish brown clay that has pale brown mottles, the next 8 inches is grayish brown clay that has very pale brown mottles, and the lower 10 inches is grayish brown and light brownish gray clay loam that has pale yellow mottles. The upper 13 inches of the substratum is pale yellow clay that has yellow and light gray mottles, and the lower part to a depth of 60 inches or more is a silica-cemented hardpan. The hardpan is white and very pale brown clay loam that has light olive gray mottles and stratified, dense layers that are 20 to 70 percent durinodes. This soil is calcareous between depths of 6 and 46 inches, and it has excess lime between depths of 33 and 46 inches. It is saline-sodic below a depth of 15 inches. In some areas the surface layer is clay. Depth to the hardpan ranges from 45 to 55 inches.

Included in this unit are about 10 percent Pedcat clay loam, leveled, 0 to 2 percent slopes, and small areas of Dosamigos clay loam, partially drained, in the higher lying areas. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Volta soil is very slow. Available water capacity is moderate to high. Effective rooting depth is 45 to 55 inches. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 42 to 60 inches in December through March. This soil is subject to brief periods of ponding after prolonged storms in December through March.

Most areas of this unit are used for irrigated crops, mainly sugar beets and alfalfa. Among the other crops grown are corn, rice, and barley. The unit is also used for irrigated pasture.

This unit is suited to irrigated crops. It is limited mainly by wetness, excess salts and sodium, the very slow permeability, and the hardpan at a depth of 45 to 55 inches. A cropping system that includes crop

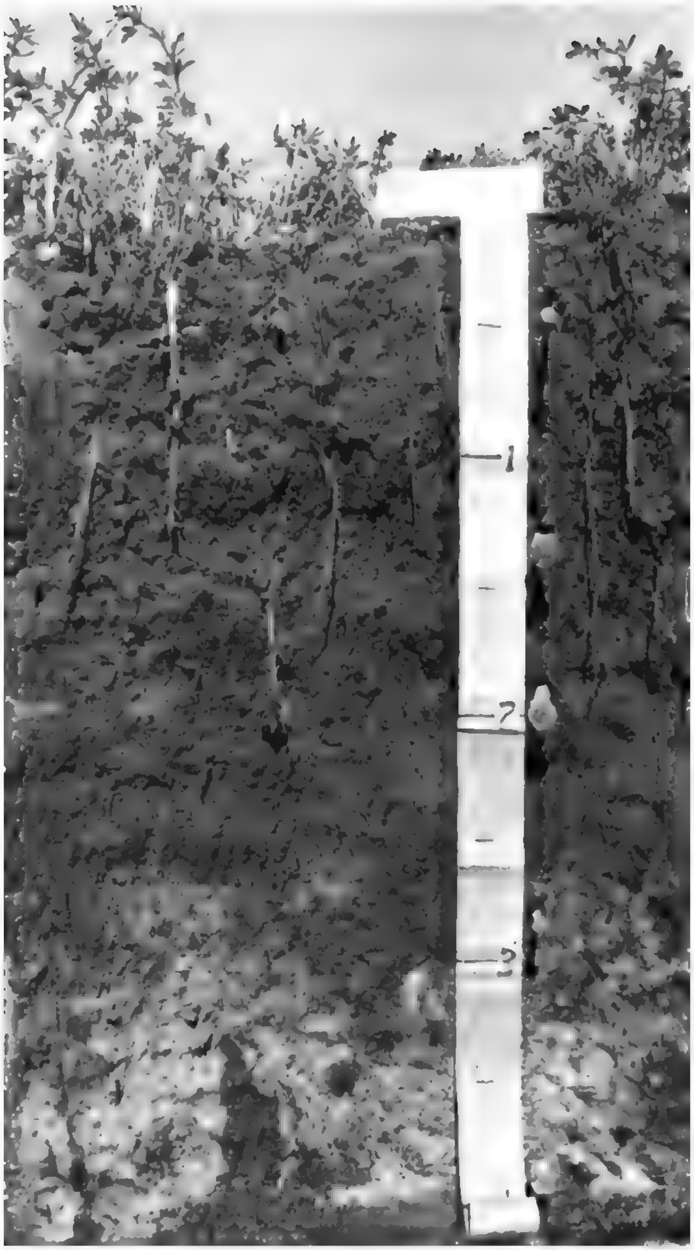

Figure 6.—Typical profile of Volta clay loam, partially drained.

rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the very slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water. Tile or open drains can be used to remove excess water and salts from the soil. Tile drainage systems can also be used to maintain the water table at a more nearly uniform depth and thus allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies. Content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim the soil in this unit. If sulfur or sulfuric acid is used, lime should be present in the surface layer.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This map unit is in capability unit IVw-6 (17), irrigated, and capability subclass VIIw (17), nonirrigated.

267—Wekoda clay, partially drained. This very deep, poorly drained soil is in the valley basin. Drainage has been improved through the use of underground and open drains. The soil formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 110 to 130 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is dark gray clay about 11 inches thick. It has yellowish brown mottles when moist. The underlying material to a depth of 60 inches or more is olive gray over olive clay that has small gypsum crystals in the lower part. This soil is calcareous below a depth of 5 inches. It is moderately sodic throughout and is saline below a depth of 11 inches. In some areas the surface layer is clay loam.

Included in this unit are small areas of Chateau clay, partially drained; Dospalos clay loam, partially drained; and Elnido clay loam, partially drained. Included areas

make up about 10 percent of the total acreage.

Permeability of this Wekoda soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 18 to 30 inches in December through March. Water applied for rice production is 4 to 6 inches above the surface in April through July. Large flood control levees and river bypasses are used to protect this soil from flooding. The soil is subject to brief periods of ponding after prolonged storms in December through February.

This unit is used for irrigated crops, mainly rice. Among the other crops grown are sugar beets and barley. The unit is also used as wildlife habitat.

This unit is suited to irrigated crops. If the unit is used for rice, it is limited mainly by the clay texture of the surface layer and excess salts and sodium. If it is used for other crops, it is limited mainly by wetness, the clay texture of the surface layer, very slow permeability, and excess salts and sodium. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, basin, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus to allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If crops other than rice are grown, irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. Because of the very slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water and the application of water should be regulated so that water does not stand on the surface and damage the crops.

This unit provides habitat for wildlife such as pheasants, doves, and waterfowl. It is limited mainly by a lack of sufficient cover and water. Irrigated fields provide food, water, and seasonal cover for wildlife; however, vegetated irrigation and drainage ditches are the principal sources of year-round cover and water.

This map unit is in capability units IIIw-5 (17), irrigated, and IVw-5 (17), nonirrigated.

268—Wisflat-Arburua complex, 15 to 30 percent slopes. This map unit is on foothills. The characteristic plant community on the Wisflat soil is mainly red brome, soft chess, California sagebrush, and California buckwheat, and on the Arburua soil it is mainly soft chess and foxtail fescue. Elevation is 1,200 to 1,600 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 230 days.

This unit is 60 percent Wisflat sandy loam and 25 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent soils that are similar to this Wisflat soil but do not have lime in the profile and small areas of Arburua loam, 8 to 15 percent slopes. Also included are small areas of Arburua loam, 30 to 50 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 3 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 13 inches, is strongly weathered, fractured shale. Hard, fractured shale is at a depth of 13 inches. This soil is calcareous throughout, and it has excess lime between depths of 3 and 11 inches. Depth to weathered shale or sandstone ranges from 10 to 15 inches. The upper 75 to 100 percent of the original surface layer has been lost through erosion. In some areas the surface layer is loam or gravelly sandy loam.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered shale or sandstone at a depth of 10 to 15 inches. Runoff is rapid, and the hazard of water erosion is high.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The underlying material is pale brown and brown loam about 17 inches thick. Below this, to a depth of 32 inches, is strongly weathered, calcareous shale that easily crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime throughout. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the

original surface layer has been lost through erosion.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the eroded surface layer and by the very low available water capacity of the Wisflat soil. Grazing should be delayed until the soils are firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soils from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Rangeland seeding is not feasible because of the limited soil depth. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, and deer. It is limited mainly by a lack of adequate water. Small, intermittent streams and springs provide water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

269—Wisflat-Arburua complex, 30 to 50 percent slopes. This map unit is on foothills. The characteristic plant community on the Wisflat soil is mainly red brome, soft chess, California sagebrush, and California buckwheat, and on the Arburua soil it is mainly soft chess and foxtail fescue. Elevation is 1,100 to 2,100 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 190 to 230 days.

This unit is 60 percent Wisflat sandy loam and 25 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent soils that are similar to this Wisflat soil but do not have lime in the profile and small areas of Arburua loam, 15 to 30 percent slopes, and Wisflat sandy loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 3 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 13 inches, is strongly weathered, fractured shale. Hard, fractured shale is at a depth of 13 inches. This soil is calcareous throughout, and it has excess lime between depths of 3 and 11 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to weathered shale or sandstone ranges from 10 to 15 inches. The upper 75 to 100 percent of the original surface layer has been lost through erosion.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered shale or sandstone at a depth of 10 to 15 inches. Runoff is rapid, and the hazard of water erosion is high.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The underlying material is pale brown and brown loam about 17 inches thick. Below this, to a depth of 32 inches, is strongly weathered, calcareous shale. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime throughout. In some areas the surface layer is clay loam. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by steepness of slope, the eroded surface layer, and the very low available water capacity of the Wisflat soil. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture.

Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Mechanical treatment is not practical because of the steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, and deer. It is limited mainly by a lack of adequate water. Small, intermittent streams and springs provide some water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

270—Wisflat-Rock outcrop-Arburua complex, 15 to 30 percent slopes. This map unit is on foothills. The characteristic plant community on the Wisflat soil is mainly red brome and soft chess, and on the Arburua soil it is mainly soft chess and foxtail fescue. Elevation is 200 to 1,500 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 35 percent Wisflat sandy loam, 30 percent Rock outcrop, and 20 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Arburua loam, 8 to 15 percent slopes; Arburua loam, 30 to 50 percent slopes; Wisflat sandy loam, 8 to 15 percent slopes; Wisflat sandy loam, 30 to 50 percent slopes; Oneil silt loam, 8 to 15 percent slopes; and Oneil silt loam, 15 to 30 percent slopes. Also included are small areas of San Timoteo sandy loam, 15 to 30 percent slopes, and soils that are similar to this Arburua soil but are 40 to 60 inches deep. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 6 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 16 inches, is strongly weathered, fractured sandstone. Hard sandstone is at a depth of 16 inches. This soil is calcareous throughout, and it has excess lime between depths of 6 and 14 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to weathered sandstone or shale ranges from 10 to 20 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered sandstone or shale at a depth of 10 to 20 inches. Runoff is medium, and the hazard of water erosion is high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The underlying material is pale brown and brown loam about 17 inches thick. Below this, to a depth of 32 inches, is strongly weathered, calcareous shale that easily crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime throughout. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion. In some areas the surface layer is clay loam.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the areas of Rock outcrop, the very low available water capacity of the Wisflat soil, and the eroded surface layer. Grazing should be delayed until the soils are firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to

withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Mechanical treatment is not practical because of the areas of Rock outcrop. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves, rabbits, and deer. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIe (15), nonirrigated.

271—Wisflat-Rock outcrop-Arburua complex, 30 to 50 percent slopes. This map unit is on foothills. The characteristic plant community on the Wisflat soil is mainly red brome and soft chess, and on the Arburua soil it is mainly soft chess and foxtail fescue. The native vegetation is mainly annual grasses and forbs. Elevation is 300 to 1,600 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 35 percent Wisflat sandy loam, 30 percent Rock outcrop, and 20 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Arburua loam, 15 to 30 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Oneil silt loam, 30 to 50 percent slopes; Wisflat sandy loam, 15 to 30 percent slopes; and Wisflat sandy loam, 50 to 75 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 6 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 16 inches, is strongly weathered, fractured sandstone. Hard sandstone is at a depth of 16 inches. This soil is calcareous throughout, and it has excess lime between depths of 6 and 14 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to weathered sandstone or shale ranges from 10 to 20 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The underlying material is pale brown and brown loam about 17 inches thick. Below this, to a depth of 32 inches, is strongly weathered, calcareous shale that easily crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime throughout. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion. In some areas the surface layer is clay loam.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is medium, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by steepness of slope, the eroded surface layer, the very low available water capacity of the Wisflat soil, and the areas of Rock outcrop. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth

to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and deer. It is limited mainly by a lack of adequate water and cover. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

272—Wisflat-Rock outcrop-Arburua complex, 50 to 75 percent slopes. This map unit is on foothills. The characteristic plant community on the Wisflat soil is mainly red brome and soft chess, and on the Arburua soil it is mainly soft chess and foxtail fescue. Elevation is 350 to 1,500 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 280 days.

This unit is 40 percent Wisflat sandy loam, 20 percent Rock outcrop, and 20 percent Arburua loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent soils that are similar to this Arburua soil but are 10 to 20 inches deep. Also included are small areas of soils that are similar to this Wisflat soil but do not have lime in the profile or have more than 35 to 60 percent gravel throughout the profile; Arburua loam, 30 to 50 percent slopes; Wisflat sandy loam, 30 to 50 percent slopes; and Conosta clay loam, 15 to 30 percent slopes. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 6 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 16 inches, is strongly weathered, fractured sandstone. Hard sandstone is at a depth of 16 inches. This soil is calcareous throughout, and it has excess lime between depths of 6 and 14 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to weathered sandstone or shale ranges from 10 to 20 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is very high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

The Arburua soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. Typically, the surface layer is brown and pale brown loam about 10 inches thick. The underlying material is pale brown and brown loam about 17 inches thick. Below this, to a depth of 32 inches, is strongly weathered, calcareous shale that easily crushes to loam. Hard, calcareous shale is at a depth of 32 inches. This soil has excess lime throughout. Depth to weathered shale or sandstone ranges from 20 to 40 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion. In some areas the surface layer is clay loam.

Permeability of the Arburua soil is moderate. Available water capacity is low to moderate. Effective rooting depth is limited by weathered shale or sandstone at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is very high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage is limited by steepness of slope, the eroded surface layer, the very low available water capacity of the Wisflat soil, and the areas of Rock outcrop. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper

placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and deer. It is limited mainly by a lack of sufficient cover and water. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

273—Wisflat-Rock outcrop-Oneil complex, 30 to 50 percent slopes. This map unit is on foothills. The characteristic plant community on the Wisflat soil is mainly red brome and soft chess, and on the Oneil soil t s mainly soft chess and wild oat. Elevation is 500 to 1,400 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 200 to 240 days.

This unit is 35 percent Wisflat sandy loam, 30 percent Rock outcrop, and 20 percent Oneil silt loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Oneil silt loam, 15 to 30 percent slopes; Wisflat sandy loam, 15 to 30 percent slopes; Wisflat sandy loam, 50 to 75 percent slopes; and San Timoteo sandy loam, 15 to 30 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Wisflat soil is shallow and well drained. It formed in material derived dominantly from sandstone and shale. Typically, the surface layer is pale yellow sandy loam about 6 inches thick. The underlying material is pale yellow sandy loam about 8 inches thick. Below this, to a depth of 16 inches, is strongly weathered, fractured sandstone. Hard sandstone is at a depth of 16 inches. This soil is calcareous throughout, and it has excess lime between depths of 6 and 14 inches. In some areas the surface layer is loam or gravelly sandy loam. Depth to weathered sandstone or shale ranges from 10 to 20 inches. The upper 25 to 75 percent of the original surface layer has been lost through erosion.

Permeability of the Wisflat soil is moderately rapid. Available water capacity is very low. Effective rooting depth is limited by weathered sandstone or shale at a depth of 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop consists mainly of exposed areas of sandstone and shale; however, in some places the rock is covered by a few inches of loamy soil material. Runoff is very rapid.

The Oneil soil is moderately deep and well drained. It formed in material derived dominantly from calcareous shale and sandstone. The upper 13 inches of the surface layer is brown silt loam, and the lower 8 inches is brown silt loam. The underlying material, to a depth of 29 inches, is yellowish brown silt loam. Calcareous shale and sandstone are at a depth of 29 inches. This soil is calcareous throughout. In some areas the surface layer is silty clay loam, sandy clay loam, or loam. Depth to sandstone and shale ranges from 20 to 40 inches. Typically, the upper 25 to 50 percent of the original surface layer has been lost through erosion.

Permeability of the Oneil soil is moderately slow. Available water capacity is low to moderate. Effective rooting depth is limited by shale or sandstone at a depth of 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by steepness of slope, the eroded surface layer, the very low available water capacity of the Wisflat soil, and the areas of Rock outcrop. The steepness of slope and the resulting runoff limit the amount of rainfall that enters the soil. Management that improves or maintains the plant cover and promotes the accumulation of litter on the surface reduces the risk of erosion and increases the infiltration of moisture. Steepness of slope limits access by livestock and promotes overgrazing of the less sloping areas. Grazing distribution can be improved by proper placement of salt and livestock watering facilities. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Grazing should be controlled so that the desirable plants, such as soft chess and wild oat, are maintained and enough plant

cover is left standing to protect the soil from erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the unit to produce plants suitable for grazing. Operating off-road vehicles on this unit results in deterioration of the plant community and increases the risk of erosion. Mechanical treatment is not practical because of the areas of Rock outcrop and steepness of slope. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as doves and deer. It is limited mainly by a lack of sufficient cover and water. Small, intermittent streams provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability subclass VIIe (15), nonirrigated.

274—Woo loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 90 to 150 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown loam about 16 inches thick. The upper 19 inches of the underlying material is yellowish brown clay loam, and the lower part to a depth of 60 inches or more is light yellowish brown loam. This soil is calcareous below a depth of 16 inches. In some areas the surface layer is clay loam or sandy clay loam.

Included in this unit are small areas of San Emigdio loam and San Emigdio fine sandy loam along small stream channels and Stanislaus clay loam. Also included are small areas of Damluis clay loam, 0 to 2 percent slopes, in the higher lying areas and soils that are similar to this Woo soil but have gravel throughout the profile and are near stream channels. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Woo soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly tomatoes, cantaloup, alfalfa, cotton, beans, and peas. Among the other crops grown are walnuts, almonds, corn, peppers, and lettuce. Some areas are used for homesite development.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for homesite development, it is limited mainly by restricted load supporting capacity and moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. If the soil is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability.

This map unit is in capability class I (17), irrigated, and capability subclass IVc (17), nonirrigated.

275—Woo loam, gravelly substratum, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 110 to 140 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown over brown loam about 19 inches thick. The upper 19 inches of the underlying material is yellowish brown over pale brown loam, and the lower part to a depth of 60 inches or more is stratified, pale brown gravelly sandy loam and gravelly loamy sand. This soil is calcareous below a depth of 19 inches. In some areas the surface layer is clay loam or sandy clay loam.

Included in this unit are small areas of Woo clay loam, 0 to 2 percent slopes; Stanislaus clay loam; Woo clay, 0 to 2 percent slopes; Dosamigos clay, partially drained; and Capay clay. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of the Woo soil is moderately slow to a depth of 38 inches and moderately rapid below this depth. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops,

mainly cotton, alfalfa, cantaloup, peppers, tomatoes, almonds, walnuts, and apricots. Among the other crops grown are lettuce and corn. Some areas are used for homesite development.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces the risk of ditch erosion.

If this unit is used for homesite development, the main limitations are the risk of seepage and restricted load supporting capacity. If the density of housing is moderate to high, community sewage systems may be needed. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIs-0 (17), irrigated, and IVs-0 (17), nonirrigated.

276—Woo sandy clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 140 to 240 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown sandy clay loam about 16 inches thick. The upper 14 inches of the underlying material is yellowish brown clay loam, the next 12 inches is yellowish brown and light yellowish brown clay loam, and the lower part to a depth of 60 inches or more is light yellowish brown gravelly sandy loam that is 25 percent gravel. This soil is calcareous below a depth of 16 inches. In some areas the surface layer is sandy loam or gravelly sandy clay loam.

Included in this unit is about 25 percent soils that are similar to this Woo soil but do not have gravel in the underlying material. Also included are small areas of Woo clay loam, 0 to 2 percent slopes, and Woo clay, 0 to 2 percent slopes. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Woo soil is moderately slow to a depth of 42 inches and moderately rapid below this depth. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly almonds, apricots, cantaloup, and cotton. Among the other crops grown are peppers. Some areas are used for homesite development.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for homesite development, the main limitations are restricted load supporting capacity, moderately slow permeability, and the risk of seepage. If the density of housing is moderate to high, community sewage systems may be needed. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability units IIs-0 (17), irrigated, and IVs-0 (17), nonirrigated.

277—Woo clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 90 to 340 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 15 inches thick. The upper 15 inches of the underlying material is yellowish brown clay loam, and the lower part to a depth of 60 inches or more is yellowish brown clay loam. This soil is calcareous throughout, and it has excess lime below a depth of 37 inches. In some areas the surface layer is loam, sandy clay loam, sandy loam, or silty clay loam.

Included in this unit are about 10 percent Woo clay, 0 to 2 percent slopes, and small areas of Stanislaus clay

loam; Woo clay loam, 2 to 5 percent slopes; Damluis clay loam, 0 to 2 percent slopes; Capay clay; Deldota clay, partially drained; Woo loam, gravelly substratum, 0 to 2 percent slopes; and Paver clay loam, 0 to 2 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Woo soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly tomatoes, cantaloup, alfalfa, cotton, beans, and walnuts. Among the other crops grown are apricots, almonds, corn, plums, peppers, lettuce, peas, and oat hay. Some areas are used for homesite development.

This unit is suited to irrigated crops. It has few limitations. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer and poor tilth.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown.

If this unit is used for homesite development, the main limitations are the moderately slow permeability and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Buildings and roads should be designed to offset the limited ability of the soil to support a load.

This map unit is in capability class I (17), irrigated, and capability subclass IVc (17), nonirrigated.

278—Woo clay loam, 2 to 5 percent slopes. This very deep, well drained soil is on alluvial fans and colluvial toe slopes. It formed in mixed alluvium and colluvium derived dominantly from sedimentary rock. Elevation is 260 to 340 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown over yellowish brown clay loam about 15 inches thick. The upper 13 inches of the underlying material is yellowish brown clay loam, the next 27 inches is yellowish brown over brownish yellow clay loam, and the lower part to a depth of 60 inches or more is brownish yellow clay loam. This soil is calcareous below a depth of 15 inches. In some areas the surface layer is gravelly clay loam.

Included in this unit are small areas of Woo clay, 0 to 2 percent slopes, and Woo clay loam, 0 to 2 percent slopes, in the lower lying areas. Also included are small areas of Pleito gravelly clay loam, 8 to 15 percent slopes, and Los Banos clay loam, 8 to 15 percent slopes, in the higher lying areas. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Woo soil is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly cotton, apricots, and oat hay. Among the other crops grown are cantaloup and tomatoes. Some areas are used for urban development.

This unit is suited to irrigated crops. It is limited mainly by steepness of slope. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, sprinkler, or drip irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, runs should be on the contour. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. All tillage should be on the contour or across the slope.

If this unit is used for urban development, the main limitations are the moderately slow permeability and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIe-1 (17), irrigated, and IVe-1 (17), nonirrigated.

279—Woo clay loam, wet, 0 to 2 percent slopes. This very deep, somewhat poorly drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Elevation is 70 to

130 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is brown clay loam about 19 inches thick. The upper 29 inches of the underlying material is yellowish brown over light yellowish brown loam that has pale yellow mottles in the lower part, and the lower part to a depth of 60 inches or more is light yellowish brown clay loam over clay that has light greenish gray and light gray mottles. This soil is calcareous below a depth of 19 inches. In some areas the surface layer is loam or sandy clay loam.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes, and Woo clay loam, 0 to 2 percent slopes, in the higher lying areas. Also included are small areas of Deldota clay, partially drained; Dosamigos clay loam, partially drained; and Pedcat clay loam, leveled, 0 to 2 percent slopes, in the lower lying areas, and small areas of Chinvar loam and Stanislaus clay loam, wet. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Woo soil is moderately slow to a depth of 48 inches and slow below this depth. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 48 to 60 inches in April through October.

Most areas of this unit are used for irrigated crops, mainly alfalfa, walnuts, beans, and corn. Among the other crops grown are cotton and tomatoes. Some areas are used for irrigated pasture and homesite development.

This unit is suited to irrigated crops. It is limited mainly by the slow permeability in the lower part of the soil and by wetness. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table during the growing season. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Tile or open drains can be used to remove excess water and salts from the soil. Tile systems can also be used to maintain the water table at a more nearly uniform depth and thus allow more acreage to be used for crops. Drainage water should be disposed of properly to maintain the quality of water supplies.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

If this unit is used for homesite development, the main limitations are the slow permeability in the lower part of the soil, wetness, and restricted load supporting capacity. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

This map unit is in capability units IIw-3 (17), irrigated, and IVw-3 (17), nonirrigated.

280—Woo clay, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans. It formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent. Elevation is 80 to 340 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the surface layer is grayish brown over brown clay about 17 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown clay loam. This soil is calcareous below a depth of 17 inches. In some areas the surface layer is clay loam or silty clay loam.

Included in this unit is about 15 percent Woo clay loam, 0 to 2 percent slopes, and Paver clay loam, 0 to 2 percent slopes. Also included are small areas of Deldota clay, partially drained, and Dosamigos clay, partially drained, in the lower lying areas, and Woo clay loam, 2 to 5 percent slopes, in the higher lying areas. Included areas make up about 25 percent of the total

acreage. The percentage varies from one area to another.

Permeability of this Woo soil is slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly cotton, cantaloup, tomatoes, almonds, apricots, alfalfa, and walnuts. Among the other crops grown are oats, sugar beets, and corn. Some areas are used for homesite development.

This unit is suited to irrigated crops. It is limited mainly by the clay texture of the surface layer and slow permeability. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate. Tilling the soil when it is moist results in compaction of the surface layer, poor tilth, and increased ponding.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop grown. Because of the slow permeability of the soil, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for homesite development, the main limitations are the slow permeability, restricted load supporting capacity, and high shrink-swell potential. Use of sandy backfill for the trench and longer absorption lines helps to compensate for the slow permeability. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has low shrink-swell potential.

This map unit is in capability units IIs-5 (17), irrigated, and IVs-5 (17), nonirrigated.

281—Woo-Anela-Urban land complex, 0 to 2 percent slopes. This map unit is on alluvial fans and the flood plain of San Luis Creek. Elevation is 140 to 160 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 30 percent Woo sandy clay loam, 0 to 2 percent slopes; 20 percent Anela gravelly loam, 0 to 2 percent slopes; and 35 percent Urban land. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Arbuckle Variant sandy loam; Bapos sandy clay loam, 0 to 2 percent slopes; and Damluis clay loam, 0 to 2 percent slopes. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Woo soil is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown sandy clay loam about 16 inches thick. The upper 14 inches of the underlying material is yellowish brown clay loam. The next 12 inches is yellowish brown and light yellowish brown clay loam, and the lower part to a depth of 60 inches or more is light yellowish brown gravelly sandy loam that is 25 percent gravel. This soil is calcareous below a depth of 16 inches. In some areas the surface layer is sandy loam or gravelly sandy clay loam.

Permeability of this Woo soil is moderately slow to a depth of 42 inches and moderately rapid below this depth. Available water capacity is moderate to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The Anela soil is very deep and well drained. It formed in mixed gravelly alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown gravelly loam about 16 inches thick. It is 20 percent gravel. The upper 14 inches of the subsoil is brown very gravelly clay loam that is 50 percent gravel, and the lower 12 inches is brown extremely gravelly clay loam that is 60 percent gravel. The substratum to a depth of 60 inches or more is brown extremely gravelly sandy clay loam that is 80 percent gravel and cobbles. In some areas the surface layer is gravelly clay loam, gravelly sandy clay loam, or clay loam.

Permeability of the Anela soil is moderate. Available water capacity is low to moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

Urban land consists of areas covered by streets, parking lots, and buildings.

This unit is used for urban and recreational development, including buildings, yards, playgrounds, streets, and parking lots.

If this unit is used for windbreaks and environmental plantings, it is limited mainly by the low to moderate available water capacity of the Anela soil. Supplemental irrigation is needed when planting and during dry periods.

If this unit is used for recreational development, it is limited mainly by the rare periods of flooding and the gravelly texture of the surface layer in the Anela soil.

If this unit is used for urban development, it is limited mainly by the risk of seepage, the moderately rapid permeability and restricted load supporting capacity of the Woo soil, and the rare periods of flooding on the Anela soil. If the density of housing is moderate to high, community sewage systems may be needed. If the Woo soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately rapid permeability. Buildings and roads should be designed to offset the limited ability of the Woo soil in this unit to support a load. Roads and streets on the Anela soil should be located above the expected flood level.

This map unit is in capability units IIs-4 (17), irrigated, and IVs-4 (17), nonirrigated.

282—Woo-Urban land complex, 0 to 2 percent slopes. This map unit is on alluvial fans. Elevation is 90 to 110 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

This unit is 25 percent Woo loam, 0 to 2 percent slopes, 20 percent Woo clay loam, wet, 0 to 2 percent slopes, and 40 percent Urban land. Areas of the Woo loam are most extensive in the western half of the unit, and areas of the Woo clay loam are most extensive in the eastern half. The components of the unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Stanislaus clay loam and Dosamigos clay loam, partially drained. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Woo loam is very deep and well drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown loam about 16 inches thick. The upper 19 inches of the underlying material is yellowish brown clay loam, and the lower part to a depth of 60 inches or more is light yellowish brown loam. This soil is calcareous below a depth of 16 inches. In some areas the surface layer is clay loam.

Permeability of the Woo loam is moderately slow. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The Woo clay loam is very deep and somewhat poorly drained. It formed in mixed alluvium derived dominantly from sedimentary rock. Typically, the surface layer is brown clay loam about 19 inches thick. The upper 29 inches of the underlying material is yellowish brown over light yellowish brown loam that has pale yellow mottles in the lower part, and the lower part to a depth of 60 inches or more is light yellowish brown clay loam over clay that has light greenish gray and light gray mottles. This soil is calcareous below a depth of 19 inches. In some areas the surface layer is loam, and in some areas the soil is clay loam throughout.

Permeability of this Woo clay loam is moderately slow to a depth of 48 inches and slow below this depth. Available water capacity is high to very high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table is at a depth of 48 to 60 inches in April through October.

Urban land consists of areas covered by streets, parking lots, and buildings.

This unit is used for urban and recreational development, including buildings, yards, parks, playgrounds, streets, and parking lots.

If the unit is used for windbreaks and environmental plantings, the main limitation is wetness of the Woo clay loam. Supplemental irrigation is needed when planting and during dry periods.

This unit is suited to recreational development. It has few limitations.

If this unit is used for urban development, the main limitations are restricted load supporting capacity and restricted permeability. The Woo clay loam is also limited by wetness. If this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the restricted permeability. If drainage outlets are available, tile drains can be placed around the perimeter of absorption fields to lower the water table. Drainage water should be disposed of properly to maintain the quality of water supplies. Buildings and roads should be designed to offset the limited ability of the soils in this unit to support a load.

This map unit is in capability units IIw-3 (17), irrigated, and IVw-3 (17), nonirrigated.

283—Xerofluvents, channeled. These very deep, poorly drained soils are in stream and slough channels of the valley basin. They formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent. The native vegetation is mainly annual

grasses, forbs, and perennial shrubs and a few trees. Elevation is 50 to 120 feet. The average annual precipitation is about 9 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

No single profile of these soils is typical, but one commonly observed in the survey area has a surface layer of light brownish gray very fine sandy loam about 5 inches thick. It has yellowish brown mottles. The upper 7 inches of the underlying material is light brownish gray fine sandy loam, the next 8 inches is light brownish gray sandy loam, and the lower part to a depth of 60 inches or more is light brownish gray fine sand over very fine sand that has brownish yellow mottles.

Included in this unit are small areas of Bisgani loamy sand, partially drained; Bisgani clay loam, occasionally flooded; Bolfar clay loam, partially drained; Bolfar clay loam, hummocky; Dospalos clay loam, partially drained; Dospalos clay, hummocky; Edminster loam; Fluvaquents, channeled; Kesterson sandy loam, ponded; Palazzo sandy loam, partially drained; and Turlock loam, leveled. Included areas make up about 10 percent of the total acreage. The percentage varies from one area to another.

Permeability of these Xerofluvents, channeled, is moderately slow to rapid. Available water capacity is low to high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The water table is at a depth of 24 to 60 inches in December through April. These soils are subject to long periods of flooding in January through March (fig. 7).

This unit is used as recreation areas, rangeland, and wildlife habitat. It can be used as a source of sand.

This unit is suited to recreational development. It is limited mainly by the periods of flooding and the sandy texture of the surface layer in some areas. The unit can be used for recreational activities such as fishing, camping, and picnicking. Care should be taken not to harm the existing wildlife habitat when planning new recreational facilities. Protection from flooding is needed.

The production of forage on this unit is limited by low rainfall, the periods of flooding, and low available water capacity in some areas. Grazing should be delayed until the soils are firm and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit is used by a variety of wildlife, including raptors, shore birds, waterfowl, upland game birds, and fur-bearing mammals. Streams and sloughs provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

This map unit is in capability unit IVw-2 (17), nonirrigated.

284—Xerofluvents, extremely gravelly. These very deep, poorly drained to well drained soils are in channels and on flood plains in and adjacent to streams on mountains and foothills. These soils formed in gravelly alluvium derived from various kinds of rock. Slope is 0 to 2 percent. The native vegetation is mainly annual grasses and forbs, perennial shrubs, and a few trees. Elevation is 140 to 1,900 feet. The average annual precipitation is about 9 to 21 inches, the average annual air temperature is 59 to 64 degrees F, and the average frost-free period is 190 to 280 days.

No single profile of these soils is typical, but one commonly observed in the survey area is brown and grayish brown extremely gravelly loamy and clayey material to a depth of 60 inches or more. It is 60 to 90 percent gravel and cobbles.

Included in this unit are small areas of Carranza gravelly clay loam, 0 to 2 percent slopes; Woo loam, 0 to 2 percent slopes; Woo clay loam, 0 to 2 percent slopes; Damluis clay loam, 2 to 8 percent slopes; Los Banos clay loam, 2 to 8 percent slopes; Oneil silt loam, 15 to 30 percent slopes; Orognen sandy loam, 2 to 5 percent slopes; and Mollic Xerofluvents. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of these Xerofluvents, extremely gravelly, is slow to moderately rapid. Available water capacity is very low to low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The water table is at a depth of 40 to 72 inches in December through March. This soil is subject to long periods of flooding in January through March.

This unit is used as recreation areas, rangeland, and wildlife habitat. It is also used as a source of gravel.

This unit is suited to recreational development. It is limited mainly by the periods of flooding and the content of gravel and cobbles. The unit can be used for recreational activities such as camping and picnicking. Care should be taken not to harm the existing wildlife habitat when planning new recreational facilities. Protection from flooding is needed.

The production of forage on this unit is limited by the

Figure 7.—Flooded area of Xerofluvents, channeled, near the San Joaquin River.

very low to low available water capacity. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, wild pigs, rabbits, and doves. Small streams provide important habitat elements such as food, water, and cover in areas otherwise dominated by annual grasses and forbs.

This map unit is in capability subclass VIs (17), nonirrigated.

285—Yokut sandy loam. This very deep, well drained soil is in areas of alluvial fan overwash on terraces. It formed in mixed alluvium derived dominantly from igneous and sedimentary rock. Slope is 0 to 2 percent. Elevation is 120 to 180 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 210 to 280 days.

Typically, the upper 6 inches of the surface layer is yellowish brown sandy loam and the lower 10 inches is light yellowish brown loam. Below this is a buried subsoil. The upper 5 inches is light yellowish brown gravelly loam that is 25 percent gravel, and the lower part to a depth of 60 inches or more is strong brown extremely gravelly sandy clay loam that is 70 percent gravel. In some areas the surface layer is loam or sandy clay loam.

Included in this unit are small areas of Woo loam, 0 to 2 percent slopes; Woo clay loam, 0 to 2 percent slopes; Xerofluvents, extremely gravelly; Damluis clay loam, 0 to 2 percent slopes; Stanislaus clay loam; and San Emigdio loam. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Yokut soil is moderate to a depth of 21 inches and moderately slow below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more, but it is restricted by the content of gravel at a depth of 20 to 30 inches. Runoff is slow, and the hazard of water erosion is slight.

Most areas of this unit are used for irrigated crops, mainly walnuts, almonds, sugar beets, and oranges,

and for irrigated pasture. A few areas are used for nonirrigated small grain and urban development.

This unit is suited to irrigated crops. It is limited mainly by the low available water capacity, restricted permeability, and restricted rooting depth. A cropping system that includes crop rotation, use of crop residue, and proper tillage improves soil tilth and increases fertility and the water intake rate.

Furrow, border, or sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Because of the moderately slow permeability in the lower part of the buried subsoil, the length of runs should be adjusted to permit adequate infiltration of water.

If this unit is used for irrigated pasture, use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture and soil in good condition. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Uniform distribution of grazing can be achieved by proper placement of salt and livestock watering facilities.

This unit is suited to nonirrigated small grain. It is limited mainly by low rainfall and the low available water capacity. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Because precipitation is not sufficient for annual cropping, a cropping system that includes small grain and summer fallow is most suitable.

If this unit is used for urban development, the main limitations are the moderately slow permeability in the lower part of the buried subsoil and the risk of seepage. If the soil in this unit is used for septic tank absorption fields, use of sandy backfill for the trench and longer absorption lines helps to compensate for the moderately slow permeability. If the density of housing is moderate to high, community sewage systems may be needed.

This map unit is in capability units IIIs-0 (17), irrigated, and IVs-0 (17), nonirrigated.

286—Yokut loam. This very deep, well drained soil is on flood plains. It formed in mixed alluvium derived dominantly from igneous sedimentary rock. Slope is 0 to 2 percent. The characteristic plant community is mainly soft chess, filaree, and foxtail barley. Elevation is 450 to 1,400 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 60 to 64 degrees F, and the average frost-free period is 190 to 240 days.

Typically, the upper 8 inches of the surface layer is brown loam and the lower 11 inches is brown sandy clay loam. Below this to a depth of 60 inches or more is a buried subsoil that is brown extremely gravelly sandy clay loam. It is 75 to 80 percent gravel and cobbles. In some areas the surface layer is sandy clay loam, gravelly loam, or gravelly sandy clay loam, and in some areas depth to the buried subsoil is 19 to 40 inches.

Included in this unit is about 10 percent Mollic Xerofluvents, channeled, in small channels. Also included are small areas of Vernalis loam, 2 to 5 percent slopes, and Carranza gravelly clay loam, 2 to 8 percent slopes. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

Permeability of this Yokut soil is moderately slow. Available water capacity is low Effective rooting depth is 60 inches or more, but it is restricted by the content of gravel at a depth of about 15 to 30 inches. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to rare periods of flooding.

This unit is used mainly as rangeland. It is also used as wildlife habitat.

The production of forage on this unit is limited by the low available water capacity. Grazing should be delayed until the soil is firm enough to withstand trampling and the more desirable forage plants have achieved sufficient growth to withstand grazing pressure. Continuous, intensive grazing results in a deteriorated plant community that has little value as forage. This unit responds to rangeland seeding and proper grazing use. The main concern is a shortage of water in years of below normal rainfall. Proper livestock management helps to maintain plant vigor and provide for the needs of wildlife.

This unit provides habitat for wildlife such as deer, wild pigs, doves, and quail. It is limited mainly by a lack of adequate water and cover. Intermittent streams and channels provide important habitat elements such as water, food, and cover in areas otherwise dominated by annual grasses and forbs. Livestock watering ponds and guzzlers provide water for wildlife during the drier part of the year and thus extend the season of use.

This map unit is in capability unit IVs-0 (17), nonirrigated.

Prime Farmland

In this section, prime farmland is defined and discussed and the prime farmland soils in this survey area are listed.

Prime farmland is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and length of growing season are favorable, and level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 168,800 acres, or nearly 28 percent, of the survey area would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The following map units meet the soil requirements for prime farmland when irrigated. On some soils included in the list, measures should be used to overcome a hazard or limitation, such as flooding, wetness, or droughtiness. The location of each map unit is shown on the detailed soil maps at the back of this publication. Soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

106	Anela gravelly loam, 0 to 2 percent slopes
109	Apollo clay loam, 2 to 8 percent slopes (where slope is 4.6 percent or less)
116	Arbuckle Variant sandy loam
123	Ayar clay, 5 to 8 percent slopes (where slope is 6 percent or less)
131	Ballvar loam, 2 to 8 percent slopes (where slope is 6 percent or less)
132	Ballvar-Pedcat, eroded association, 0 to 5 percent slopes (Ballvar soil only)

137 Bisgani loamy sand, partially drained
139 Bolfar clay loam, partially drained
144 Capay clay loam
145 Capay clay
149 Chaqua loam, 2 to 8 percent slopes (where slope s 6 percent or less)
154 Cole Variant clay loam, 2 to 5 percent slopes
161 Damluis clay loam, 0 to 2 percent slopes
163 Damluis gravelly clay loam, 0 to 2 percent slopes
164 Damluis gravelly clay loam, 2 to 8 percent slopes (where slope is 6 percent or less)
167 Deldota clay, partially drained
170 Dospalos clay loam, partially drained
171 Dospalos c ay, partially drained
174 Dospalos-Urban land complex, partially drained (Dospalos soil only)
178 Elnido sandy loam, partially drained
180 Elnido clay loam, partially drained
181 Escano clay loam, partially drained
192 Henmel clay loam, partially drained
193 Herito loam
206 Los Banos clay loam, 0 to 2 percent slopes
207 Los Banos clay loam, 2 to 8 percent slopes (where slope is 6 percent or less)
209 Los Banos-Pleito clay loams, 2 to 8 percent slopes (where slope is 6 percent or less)
210 Los Banos Variant gravelly sandy clay loam
228 Palazzo sandy loam, partially drained
229 Paver clay loam, 0 to 2 percent slopes
230 Paver clay loam, 2 to 5 percent slopes
246 San Emigdio fine sandy loam
247 San Emigdio loam
253 Stanislaus clay loam
254 Stanislaus clay loam, wet
255 Stanislaus-Dosamigos-Urban land complex (Stanislaus and Dosamigos soils only)
263 Vernalis loam, 2 to 5 percent slopes
274 Woo loam, 0 to 2 percent slopes
275 Woo loam, gravelly substratum, 0 to 2 percent slopes
276 Woo sandy clay loam, 0 to 2 percent slopes
277 Woo clay loam, 0 to 2 percent slopes
278 Woo clay loam, 2 to 5 percent slopes
279 Woo clay loam, wet, 0 to 2 percent slopes
280 Woo clay, 0 to 2 percent slopes
281 Woo-Anela-Urban land complex, 0 to 2 percent slopes (Woo and Anela soils only)
282 Woo-Urban land complex, 0 to 2 percent slopes (Woo soil only)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

By C. William Yost, soil conservationist, and Clarence U. Finch, agronomist, Soil Conservation Service.

General management needed for crops and for hay and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service and the Storie index used by the California Agricultural Experiment Station are explained, and the estimated yields of some of the main crops and hay and pasture plants commonly grown are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." More specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The main concerns for managing the soils in this survey area that are suited to irrigated and nonirrigated crops are maintaining or improving production and minimizing erosion. Practices that can be used to achieve these goals, as well as the main crops that are suited to the area, are briefly discussed in the following paragraphs.

Chiseling and subsoiling. These operations are used to increase the effective rooting depth of soils that have a plowpan or hardpan. Chiseling the plowpan and subsoiling the hardpan increase permeability and internal drainage, help to prevent development of a perched water table, and allow deeper penetration of roots. Chiseling clay soils is only temporarily beneficial, because they eventually return to their original condition. The depth of ripping should be based on the depth of the hardpan in a given soil.

Conservation cropping systems. These cropping systems consist of growing crops in combination with suitable cultural and management practices. A suitable conservation cropping system is one that provides benefits that more than compensate for the resulting deterioration of the soil and the water resources used.

Conservation cropping practices that improve the soil include rotation of various row and field crops and return of crop residue to the soil. They also include using cover crops of grasses and legumes, adequate fertilization, and weed and pest control.

Various cropping systems are used in the survey area. They include several combinations of individual crops. A typical example is alfalfa, cotton, small grain, and sugar beets grown in rotation. The rotation system can be improved by periodically growing a cover crop of grass. This improves soil structure, enhances water penetration, improves air movement, and increases root penetration.

Conservation tillage. Such tillage involves keeping to a minimum the number of operations used when preparing seedbeds, planting crops, and controlling weeds, while keeping at least 30 percent of the soil surface covered by residue after planting. Excessive tillage tends to destroy soil structure, cause compaction, and reduce organic matter content, and it could create a plowpan below the tilled layer. These conditions increase the risk of erosion and reduce the water intake rate of the soil as well as the penetration of roots. Varying the depth of tillage helps to prevent the development of a plowpan. Combining tillage operations to reduce the number of trips over a field and delaying tillage when the soil is wet are other important factors in maintaining soil tilth, preventing compaction, and conserving energy.

Cover crops. These crops are needed in orchards and vineyards and on soils that are left fallow during the rainy season. Cover crops provide protection from erosion, help to maintain or increase penetration of water, and improve soil tilth.

Growing annual grasses or legumes in orchards and vineyards is advantageous because these plants set viable seed and then die early in summer; therefore, they do not deplete soil moisture in the latter part of the growing season. Annual grasses and legumes should be seeded before October 15 to protect the soil from erosion in winter. In spring, before the frost season, the cover crop can be mowed to a height of 2 to 4 inches to reduce possible frost damage to the crop. The cover crop should then be allowed to produce seed. After viable seed has set, the cover crop can be mowed to any height. The seed will be available the following fall to start the annual growth cycle again.

Crop residue use. Crop residue is used by returning it to the soil, which helps to maintain soil tilth, organic matter content, and fertility and to reduce erosion. On sloping soils, residue should be left on or near the soil surface during critical erosion periods. Organic matter in the soil influences the development of good soil structure and the general physical environment of the soil, and it increases the infiltration and conservation of water.

It is particularly important that a supply of organic matter be continually returned to the soil. The easiest and most common way of doing this is to return the residue produced by the crops grown. Crops that produce a large amount of residue, such as corn, safflower, rice, wheat, and barley, should be grown to make up for those in the cropping system that produce a small amount of residue. Other excellent sources of organic matter are prunings from orchards and vineyards, animal manure, and residue from legumes.

Erosion control. Practices to control erosion generally are needed on sloping soils. As the steepness of the slope increases, the risk of erosion also increases. Erosion can be recognized by the accumulation of soil material at the base of slopes, in drainageways, and against fence lines or by the formation of rills and gullies.

Many practices are used to control erosion. Applying water at the proper rate and in the correct amount helps to prevent erosion on irrigated soils. Using cover crops and crop residue, conservation tillage, and contour farming are some of the management practices that can be used to control erosion. In sloping orchards or vineyards, erosion in drainageways can be controlled by establishing and maintaining grassed waterways.

Structural measures may also be needed to control erosion. Diversions, grade stabilization dams, water retention dams, and irrigation water conveyance structures may be needed, either individually or in combination.

Excess water removal. This practice includes removal of both surface and subsurface water to divert or prevent accumulation of excess water from either rainfall or irrigation. It may be needed in low lying areas, in swales, or at the lower end of irrigated fields. It is also needed in areas where there is a water table within the root zone or where salts are moving up through the soil as a result of a high water table in or near the root zone.

Excess water can be controlled by shaping and grading land; leveling land to be irrigated; providing drainage ditches, tile drains, and irrigation tailwater recovery systems; and properly managing irrigation water.

Leveling of irrigated land. This practice is necessary for conserving irrigation water. It helps to ensure that irrigation water is applied uniformly to the entire field. In addition to better water management, land leveling permits fields to be arranged so as to conserve labor, time, and energy. Following the initial leveling of the field, the first crop to be planted should be an annual crop. This gives the filled areas a chance to settle, after which the field can be smoothed before planting a

Figure 8.—Furrow irrigated tomatoes in an area of San Emigdio loam south of Gustine.

longer lived crop. Irrigation grades should be uniform. They should be determined by the topography, soil texture, and rate of water application.

Irrigation water management. This practice involves controlling the rate, amount, and timing of irrigation water applications in order to supply the water needed by crops in a planned and efficient manner. It provides for the efficient use of the available irrigation water to achieve the desired crop response and to minimize soil erosion. It also reduces water losses and protects the quality of the water. Irrigation methods used in this survey area are furrow, border, sprinkler, and trickle systems. Furrow and border irrigation should be limited to nearly level soils (fig. 8). Sprinkler irrigation is better suited to the sloping soils in the area. Trickle irrigation is used mainly in orchards and vineyards. Irrigation water should be applied at a rate and in amounts needed to meet crop requirements and according to the soil characteristics without causing excess runoff or deep percolation, except in saline or sodic areas. Additional irrigation water may be needed on the saline and sodic soils in the survey area to meet the requirements for leaching and to provide adequate water for plant use.

Subsurface water removal. Removal of subsurface water is required on some soils to keep low quality water below the primary root zone of plants and to leach salts from the soil profile. A perched water table is present in most of the soils in the valley basin and on the rim of the basin. Among the soils that need subsurface drainage are Pedcat loam, 0 to 2 percent slopes, and Volta clay loam.

Subsurface drainage can be achieved by constructing open drainage ditches and installing tile

drains or other perforated pipe systems (fig. 9). Proper disposal methods are needed for the poor quality water that is collected by the drainage systems. High quality ground water should be protected from possible pollution by the low quality drainage water.

Surface water control. Measures to control surface water are needed in areas where accumulations of rainfall or irrigation water are a problem, such as in low-lying areas and at the end of irrigated fields. Excess water in these areas limits crop production and may provide habitat for unwanted weeds or mosquitos. Excess water on the surface can be controlled by properly leveling the land, constructing irrigation tailwater return systems, and properly managing irrigation water. Low-lying soils, such as those of Dospalos-Bolfar complex, occasionally flooded, and Bisgani clay loam, occasionally flooded, and land near major streams, may require diversions, dikes, or canals to divert and control flood water.

Summer fallow. This practice, used in areas where nonirrigated grain is grown, consists of maintaining land free of weeds during summer to store moisture in the soil for the next crop. Under a fallow system of farming, crop production tends to be more stabilized and complete crop failures are less frequent during years of low rainfall. In this survey area a typical cropping system consists of planting and harvesting small grain one year and maintaining summer fallow the next year. The danger of erosion on sloping soils is reduced by keeping as much residue as feasible on the surface. The use of subsurface tillage implements such as chisels, blade-type sweeps, or rodweeders is a suitable practice. After harvest, the first operation should be at a shallow depth.

Toxic salt reduction. This practice is needed on soils that contain excessive amounts of total salts and sodium. This saline-sodic condition results in a restricted water intake rate and available water capacity. The soils may be improved by using soil amendments such as calcium and by leaching with water. A common way of adding calcium to the soil is to apply 5 to 15 tons of gypsum per acre. The exact requirement should be determined by soil tests. To leach a saline-sodic soil, the land should first be leveled and then sufficient water should be applied to wash the salts below the root zone of the crops that will be planted. One common way of reclaiming soils in this survey area is to plant rice for 1 or 2 years to leach the salts from the soil, after which barley, cotton, alfalfa, or sugar beets can be planted.

Use of crop residue speeds up the reclamation process in saline-sodic soils. Salt tolerant crops that produce a large amount of residue should be used. Crop residue returned to the soil provides for better aeration, higher water intake rate, and improved soil structure and tilth. These benefits can also be obtained by applying manure or growing green manure crops.

Hay management. Proper management of hay is needed to prevent soil deterioration, provide maximum production, maintain a desirable plant community, and extend the life of the hay crops.

Practices that can be used in a hayland management program include irrigation water management, fertilization, mowing at the proper time for highest quality, and baling when the soils are not wet.

When establishing irrigated hay crops, seed early in fall or in spring into a firm seedbed. The first mowing should be delayed until the plants are well established. Planting on raised beds improves production and provides better drainage of wet or fine textured soils. The width of beds needs to be adjusted for different soils and for the width of harvest equipment wheels. The spacing of borders on flood irrigated hayland should be in multiples of the cutting width of the mower to be used.

Pasture management. Management of pasture is needed to prevent soil deterioration, provide maximum production, maintain a desirable plant community, and extend the life of the pasture.

Practices that can be used in an irrigated pasture management program include properly managing irrigation water, rotation grazing, fertilizing, harrowing or dragging to scatter animal droppings, mowing as necessary to maintain uniform growth, and controlling weeds. Grazing when irrigating or when the soil is wet is not a suitable practice. Grazing should start when plants are 8 to 10 inches high, and livestock should be removed when a minimum of 3 to 4 inches of stubble remains. To maintain the density of the stand, annual pastures should be managed so that sufficient plants produce seed to maintain a good stand.

The main crops that are suited to this survey area are discussed in the following paragraphs.

Field crops. Among the field crops that are suited to this survey area, where water is available for irrigation, are cotton, wheat, barley, alfalfa, sugar beets, corn, cantaloup, tomatoes, and rice. These crops are grown in the valley basin and on alluvial fans, terraces, and foothills.

Grain hay and small grain are mostly grown under irrigation. Nonirrigated grain is best suited to the areas of moderately deep to deep, well drained, calcareous loams, silt loams, clay loams, and clays in the part of the survey area on the foothills and terraces of the

Figure 9.—Area of Bolfar clay loam, partially drained, east of Los Banos, that is drained by open ditches.

Coast Range. Grain crops grown include barley, oats, and wheat; however, most of the nonirrigated acreage is planted to barley.

Fruit and nut crops. Among the fruit and nut crops that are suited to the survey area are apricots, almonds, walnuts, and grapes. Apricots are suited to deep, loamy and clayey soils that have good drainage. These soils are on gently sloping alluvial fans adjacent to and northeast of Interstate 5, where good air drainage prevents frost damage.

Almonds are suited to most of the soils northeast of the steep foothills, where water drainage is good. Walnuts are suited to deep, well drained soils on alluvial fans that are protected from frost by good air drainage. Most of these soils are northeast of Interstate 5.

Irrigated pasture. Soils that are suited to pasture are moderately deep and are in areas where water is available. Akaroa orchardgrass or fawn fescue together with birdsfoot trefoil, ladino clover, or strawberry clover are pasture mixtures that are well suited to the soils in the survey area.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in tables 3A and 3B. In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure,

and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system s adapted to the soils and to the crops grown that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a m nimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in tables 3A and 3B are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small or yield informat.on is not available. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Storie Index Rating

By Gordon L. Huntington, lecturer and soil spec a ist, Department of Land, A r, and Water Resources, University of California, Davis.

The soils in the survey area are rated in table 4 according to the Storie index *(9)*. This index expresses numerically the relative degree of suitability of a soil for general intensive agricultural use as it exists at the time of evaluation. The rating is based on soil characteristics only and is obtained by evaluating factors such as soil depth, surface soil texture, subsoil characteristics, drainage, content of salts and sodium, and relief. Other factors, such as availability of water for irrigation, climate, size and accessibility of the mapped areas, and distance to markets, that might determine the desirability of growing certain plants in a given locality are not considered. Therefore, in itself, the index should not be used as a direct indicator of land value. However, where the local economic and geographic factors are known to the user, the Storie index provides additional objective information for land tract value comparisons.

Four general factors are used in determining the index rating—*A*, the permeability, water retention characteristics, and depth of the soil profile; *B*, the texture of the surface soil; *C*, the dominant slope of the soil body; and *X*, other soil conditions more readily subject to management or modification by the land user. In this survey area the X factor conditions include drainage, flooding, erosion, fertility, microrelief, and salts and sodium. For some soils more than one of these conditions are used in rating. All of the factors are evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable, or ideal, condition for general crop production. Lower percentage ratings are assigned for conditions that are less favorable. Factor ratings, in percent, are selected from tables prepared from data and observations that relate soil properties to plant growth and crop yield *(8)*. In the tables currently used *(9)*, certain soil properties are allowed ranges of values to conform with variations of the properties in relation to their effect on the suitability of the soil for general agricultural purposes; for example, soil depth or proportion of gravel present in a gravelly surface layer. The modal condition of a soil property, as it is described in a soil map unit, is used to select a value for rating when a range of tabular values exists.

The index rating for a soil is obtained by multiplying the values given to its four general factors, A, B, C, and X. If more than one X factor condition exists for a soil, the values for each condition act as additional multipliers. Thus, any of the general factors or X factor conditions may dominate or control the final rating. For example, consider a soil such as Volta clay loam. This is a deep soil that has a weak hardpan at a depth of 45 to 55 inches. This warrants a rating of 60 percent for factor A. It has a workable clay loam surface layer that requires some care and additional energy for preparing a seedbed and subsequent cultivation. This warrants a rating of 85 percent for factor B. The soil is nearly level, which warrants a rating of 100 percent for factor C. However, the soil has a seasonal high water table at a depth of 12 to 36 inches and is subject to flooding from seasonal streamflow as well as to ponding from nearby areas managed as waterfowl habitat. This warrants a value of 50 percent. This soil is also essentially sodic or saline-sodic throughout. This also warrants a value of 50 percent. The latter two values (X factor conditions) multiplied together produce a value of 25 percent for factor X. Multiplying A, B, C, and X gives a Storie index of 13 for this soil under the conditions described. If, in time, the water table and flooding can be controlled and the sodic or saline-sodic conditions improved, the Storie index can be increased by assigning appropriate higher values to the X factor conditions to reflect the changes. The Storie index rating of 28 for Volta clay loam, partially drained, illustrates this.

Soil complexes or associations in the survey area, such as Wisflat-Arburua complex, 30 to 50 percent slopes, or Akad-Conosta association, 30 to 50 percent slopes, are rated to reflect the proportion of the dominant soils described in the map units. Each of the dominant soils in such units is rated separately and the

values shown in table 4. The Storie index rating for each unit is a weighted average for the separate ratings. Miscellaneous area map units, such as Pits, Rock outcrop, and Urban land, are not evaluated in terms of factors A, B, C, and X. They have features that preclude common agricultural use; therefore, they have an index rating of zero.

Soils are placed in grades according to their suitability for general intensive agriculture as shown by their Storie index ratings. The six grades and their range in index ratings are:

Grade 1	80 to 100
Grade 2	60 to 79
Grade 3	40 to 59
Grade 4	20 to 39
Grade 5	10 to 19
Grade 6	Less than 10

In this area, soils in *Grade 1* are well suited to intensive use for irrigated crops that are climatically adapted to the region. *Grade 2* soils are good agricultural soils, although they are not so desirable as soils in Grade 1 because of moderately fine surface textures, coarser surface or subsoil textures, a somewhat less permeable subsoil, gentle to moderate slopes, or drainage that is less than well drained. *Grade 3* soils are only fairly well suited to agriculture and are limited in their use because of moderate to steep slopes, moderate soil depth, a less permeable subsoil, clayey or gravelly surface soil textures, poor drainage, microrelief, erosion, or accumulations of salts and sodium. *Grade 4* soils are poorly suited. They are severely limited in their agricultural potential because of shallower depth, steeper slopes, increased microrelief, more salts and sodium, flooding, or poorer drainage than soils in Grade 3. *Grade 5* soils are very poorly suited to agriculture. *Grade 6* consists of soils and miscellaneous areas that are not suited to agriculture at all because of very severe to extreme limitations with regard to the aforementioned properties. Table 4 lists the grade for each soil in this area.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(13)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils generally are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be

suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. The numbers used to designate units within the subclasses are as follows:

0. Indicates limitations caused by stony, cobbly, or gravelly material in the substratum.

1. Indicates limitations caused by slope or by an actual or potential erosion hazard.

2. Indicates a limitation of wetness caused by poor drainage or flooding.

3. Indicates a limitation of slow or very slow permeability of the subsoil or substratum is caused by a clayey subsoil or by a substratum that is semiconsolidated.

4. Indicates a low available water capacity in sandy or gravelly soils.

5. Indicates limitations caused by a fine-textured or very fine-textured surface layer.

6. Indicates limitations caused by salts or sodium.

7. Indicates limitations caused by rocks, stones, or cobbles.

8. Indicates that the soil has a very low or low available water capacity because the root zone generally is less than 40 inches deep over massive bedrock.

9. Indicates that a problem or limitation is caused by low or very low fertility, acidity, or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.

The capability classification, including the unit designation where applicable, of each map unit is given in the section "Detailed Soil Map Units." In addition, the classification, including only the class and subclass designations, is given in table 5.

Land Resource Areas

Capability classification is further refined by designating the land resource area in which the soils in a unit occur. A land resource area is a broad geographic area that has a distinct combination of climate, topography, vegetation, land use, and general type of farming. Parts of two of these nationally designated areas are in this survey area. These areas and their numbers are Sacramento and San Joaquin Valleys (17) and Central California Coast Range (15). The number of the resource area is added, in parentheses, to the capability classification at the end of the map unit descriptions.

Land resource area 15.—The soils in this resource area usually receive 9 to 24 inches of rainfall; have slopes of more than 2 percent; are underlain by rock parent material; support natural vegetation of grass, brush, and trees; and are used as rangeland.

Land resource area 17.—The soils in this resource area usually receive 8 to 12 inches of rainfall, commonly have slopes of less than 2 percent, formed in very deep alluvial deposits, and commonly are cultivated.

Management practices needed for soils with similar characteristics commonly differ from one resource area to another.

Management of Saline and Sodic Soils

Most of the alluvial soils in the survey area are to some degree saline, sodic, or saline-sodic.

Saline soils are those that contain sufficient soluble salts to interfere with the growth of most crops but lack sufficient sodium to alter the physical properties of the soils. A saline soil is defined as a soil having a conductivity of the saturation extract, in the root zone, of more than 4 millimhos per centimeter and an exchangeable sodium percentage of less than 15. Bolfar clay loam, hummocky, is an example.

Sodic soils include those containing sufficient exchangeable sodium to interfere with the growth of most crops and to affect the physical properties of the soils. The exchangeable sodium percentage is more than 15, and the conductivity of the saturation extract is less than 4 millimhos per centimeter. Kesterson sandy loam is an example.

Saline-sodic soils include those containing soluble salts in sufficient quantity to interfere with the growth of most crops and sufficient exchangeable sodium to adversely affect the physical properties of the soils and plant growth. The exchangeable sodium percentage is more than 15, and the conductivity of the saturation extract is more than 4 millimhos per centimeter. Pedcat loam, 0 to 2 percent slopes, is an example.

No attempt was made in this survey area to map the degrees of salinity or sodicity within the saline, sodic, or saline-sodic soils. The saline-sodic condition in the soils is ever changing because of the addition of soil amendments and fertilizers used in crop production. Amendments such as sulfur and sulfuric acid, if used for a time, will lower the reaction of a soil at its surface. Fertilizers such as ammonium sulfate, ammonium nitrate, and ammonium phosphate all have an acid reaction. Although it takes a considerable amount of time to change the saline-sodic status of a soil, small changes occur yearly.

Saline, sodic, and saline-sodic soils can be improved by adding soil amendments and leaching the soils with more water than they can hold. This provides deep percolation of the water and moves the salts to a lower level in the soil profile. When leaching salts from the soil, good quality water is needed. The water used should be low in total salt content, and the salts should be calcic rather than sodic. Low sodium water is important because sodium attaches itself to the clay particles as the salts pass through the soil profile. This causes the soil to become dispersed, which in turn reduces the permeability of the soil and makes leaching of the salts very difficult.

Good drainage is needed to improve the saline, sodic, and saline-sodic soils. Some of the soils have a water table that is well below a depth of 6 feet, and artificial drainage is not needed. Only water and soil amendments are required to improve these soils. Salts in these soils can be leached to a depth that will allow for root development.

Many of the saline, sodic, and saline-sodic soils in the survey area are very poorly drained, poorly drained, or somewhat poorly drained and have a water table at a depth of 1.5 to 5.0 feet. Artificial drainage of these soils is needed. Open ditches and underground drains are the two most common methods used to lower the water table. Salts can be leached out of the soil profile with the water as it moves downward. The rate at which the water moves through the profile depends on the permeability of the most restrictive layer. Coarse textured soils, such as sands, loamy sands, and sandy loams, range in permeability from 20 to 2 inches per hour; moderately fine textured soils, such as fine sandy loams and loams, 2 inches to less than 0.25 inch per hour; and fine textured soils, such as silty clays and clays, less than 0.25 inch per hour. When soluble salts are leached from the soil, sodium remains attached to the clay particles in the soil. The soil then becomes dispersed and behaves similarly to a clay soil regardless of the actual texture, and it has a very slow downward movement of water.

Soil amendments commonly are added to soils before the salts are leached out with water. The amendments that are most commonly used are gypsum, sulfuric acid, and sulfur. The choice of an amendment depends on the properties of the soil. Sulfuric acid or sulfur, which combines with oxygen and water to form sulfuric acid, works best in calcareous soils. Sulfuric acid reacts with lime to form gypsum. Gypsum supplies calcium to the clay particles, replacing the attached sodium. This calcium flocculates the soil and helps to restore permeability. Sodium can be leached from the root zone by the application of excessive amounts of water. Generally, 1 acre-foot of water will remove half of the soluble salts from 1 acre-foot of soil. Gypsum can be added to noncalcareous soils to provide a supply of a soluble form of calcium, which is used to replace the sodium on the clay particles.

Rangeland

By Franklyn E. Archuleta and John E. Hansen, range conservationists, Soil Conservation Service.

About 45 percent of this survey area is rangeland. Commercial cow-calf and stocker operations are dominant in the western part of the area. Sheep operations commonly are concentrated in the foothills. Rangeland is continually being converted to irrigated farmland, but at a slower rate than in the past. Livestock grazing is not the main use of some areas; the wetlands are managed mainly as habitat for waterfowl.

Late in summer and in fall, forage commonly is supplemented by hay or protein concentrate. The adequate green feed period starts about February and lasts until the middle of May.

Soils strongly influence the natural vegetation. Soil reaction can influence fertility by limiting the availability of critical elements required by certain plant species. Sodic soils that are loamy generally occupy the valley basin and basin rim, in the central part of the survey area. Soil texture has a great influence on the kinds of plants that grow. Forage production on moderately fine textured soils is higher than that on shallow, coarse textured soils. Loamy to clayey soils can provide more available water to plants and thus support more forage. Drought tolerant plant communities are restricted to the areas of shallow, coarser textured soils.

Woodland areas are in the western part of the survey area, where the soils are moderately coarse textured to fine textured. In transitional precipitation zones, blue oak woodland merges with annual grassland to form grazeable woodland. Soil conditions commonly control the distribution of woodland. Soil temperatures are cooler on northerly slopes, and they are a factor in determining where blue oak woodland occurs. Other important factors that influence where trees grow include the occurrence of fire and human intervention.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 6 shows, for each soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Explanation of the column headings in table 6 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the characteristic plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the characteristic plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the characteristic plant community *(7, 15)*. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the characteristic plant community for that site. Such management generally results in the optimal production of vegetation, reduction of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below that of the characteristic plant community meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Suitable for use in this survey area are grazing management practices such as proper grazing use, proper season of use, distribution of livestock grazing, and planned grazing systems and supplemental practices such as rangeland seeding.

Proper grazing use is grazing at an intensity that maintains enough cover to protect the soil and helps to maintain or improve the quality and quantity of desirable vegetation. On annual rangeland, seed is the most common source of reproduction *(10)*. It is necessary to allow a part of the more desirable species in the plant community to set seed if they are to be maintained; therefore, grazing should be controlled so that these species are allowed to reproduce. The dry vegetation left on the rangeland at the beginning of the fall-winter period helps to promote the growth of green forage. Leaving an adequate amount of stubble at the end of the grazing season allows new seedlings to become established faster and grow better in winter. It also protects the new plants from drying winds and sun. The decomposing mulch that is on the soil surface and is partially mixed with the mineral soil material conserves moisture and promotes establishment and early growth of each year's seedlings.

The amount of residue left should be 700 to 1,000 pounds of air-dry vegetation per acre in areas where slopes are less than 30 percent and 1,000 to 1,200 pounds in areas where slopes are more than 30 percent. Determination of the amount of residue left should be done just prior to the beginning of the rainy season. Normally this will be about November 1.

Proper season of use is determined by the characteristics of the plant community. It entails grazing only during seasons when the range is most suitable for grazing. In this survey area three seasons are

recognized—the dry forage season, the inadequate green feed season, and the adequate green feed season. The dry forage season lasts from about June through October. The inadequate green feed season usually lasts from November through January. In this season most of the plant growth occurs during short, rainy periods. Supplemental feeding is necessary during periods of unpredictable plant growth. The adequate green feed season lasts from about February through May. Adequate forage means that there is enough forage during the grazing season to provide for livestock as well as to leave enough of the current year's growth of desirable forage plants to provide for adequate seeding the following year.

Distribution of livestock grazing involves all of the practices that can be used to influence livestock to spread out and use the forage supply within a grazing unit as uniformly as possible. The objective is to use the optimal amount of forage consistent with proper management of the grazing site.

Grazing sites differ in the practical efficiency of grazing that can be achieved. This is because of differences in the distribution of water and shade, the topography, the kinds of forage available, the class of livestock grazing the sites, and the season when they are grazed. The proper use of salt is important in obtaining uniform use. Salt should be placed in areas where grazing is desired. It should not be placed close to watering facilities.

Where sheep are grazed in this survey area, it is practical to haul water, which results in improved grazing distribution as well as increased weight gains in the animals. Open herding of sheep is an effective means of distributing grazing pressure, and it reduces the incidence of plant poisoning. Close herding keeps the animals bunched and leads to trampling of forage. A one-night bedding system should be used. Continual bedding in the same area causes vegetation to be severely trampled and results in compaction of the soil.

Cattle ordinarily are not herded on rangeland; however, a rider generally is needed to guide cattle in rough or poorly watered areas. Calf populations are maximized by keeping bulls and cows distributed in proper ratio. Grazing units are best used by moving cattle from swales to underused areas.

Developing livestock watering facilities, wherever economically or physically feasible, helps to distribute grazing pressure. If animals are required to travel long distances to and from water, weight gain and grazing distribution are limited. Stock trails and walkways are also effective in distributing livestock grazing. In steep, rocky places and in areas of dense brush, stock trails provide easier access to forage producing areas.

Planned grazing systems involve use of procedures in which two or more grazing units are alternately rested and grazed in a sequence over a period of years. The rest period can be throughout the year or during the growing season of the desirable plants. A system may be designed to help achieve several objectives, such as to ensure a supply of forage throughout the grazing season, protect a watershed, and enhance the quality of wildlife habitat. A suitable system is one that fits the needs of individual operating units and helps meet the objectives of rangeland managers.

When grazing management alone does not achieve the range manager's objectives within a reasonable length of time, one or more supplemental practices can be applied. These practices include rangeland seeding where rainfall is adequate, brush management, and cross-fencing. Fertilization of rangeland soils generally is not economically feasible in this survey area.

Rangeland seeding on suitable sites can improve rangeland by establishing forage plants and increasing production, or it can be used in converting cropland to rangeland. This practice improves the natural beauty of grazing land and reduces erosion.

Woodland Management and Productivity

By Sherman J. Finch, forester, Soil Conservation Service.

The western part of this survey area supports stands of oak woodland. These stands commonly are on north and east aspects.

Two major forest types are present in this survey area—the blue oak-Digger pine type and the California coast live oak type. The blue oak-Digger pine, which is most extensive, includes occasional California buckeye. It also includes small stands of interior live oak, which are in very rocky areas and around rock outcroppings. The California coast live oak type is present to a limited extent near the ridgetops along the far western edge of the survey area. California juniper are scattered throughout areas of these forest types.

The density of the tree canopy varies. The denser stands are present in areas of greater rainfall and on the more favorable north and east aspects. Volumes of firewood ranging from 14 to 30 cords per acre have been measured in the blue oak stands.

The oak woodland in the survey area is considered to be one of California's most valuable natural resources. The oaks have been harvested mainly for use as firewood, for charcoal production, and for range improvement. There is an increasing demand for firewood within the region, which could result in an

increase in the harvesting of the oaks. The stands of oak, which occur naturally in the Coast Range, also provide significant esthetic value.

A major problem in harvesting the oak is their very low potential for regeneration. There are few blue oak seedlings to be found. The blue oak does resprout from the stump when cut, but the potential for regeneration from resprouting is low and may be further reduced if deer or livestock are allowed to graze on the sprouts.

The oaks produce acorns that have some value as forage for livestock and wildlife. Abundant seed crops are produced every 2 or 3 years, and bumper crops every 5 to 8 years.

Fire, which is a threat annually, is less damaging to the blue oak than to the Digger pine.

Care in harvesting the oak is needed to prevent erosion and to retain the tree cover. The steepness of slope and restricted road access in the survey area limit harvesting. Careful location of access roads is necessary to prevent erosion and loss of productivity and to minimize the number of roads needed. Care should also be exercised during the rainy season to prevent trampling and compaction of the soil. Soils that have a clay or clay loam surface layer also limit harvesting, especially when they are wet. Drainage from roadways should be carefully planned to prevent erosion.

Table 7 can be used by woodland owners or managers in planning the use of soils for firewood production. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for commercially important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *X* indicates stoniness or rockiness; *W*, excessive water in or on the soil; *T*, toxic substances in the soil; *D*, restricted root depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, high content of coarse fragments in the soil profile; and *R*, steep slopes. The letter *O* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: X, W, T, D, C, S, F, and R.

In table 7, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

Common trees are those that are suited to the soils in the survey area.

Windbreaks and Environmental Plantings

By Sherman J. Finch, forester, Soil Conservation Service.

Windbreaks protect campsites, roads, livestock, buildings, and yards from wind. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Properly located windbreaks, along with other cultural practices, can effectively reduce the risk of soil blowing. Energy savings are also a recognized benefit of well planned windbreaks.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Supplemental watering is necessary during the first 3 years after planting windbreaks to ensure their establishment. Windbreaks should be protected from fire and grazing. Competition from weeds also needs to be controlled to ensure survival of the plantings.

Shrub species suitable for use in windbreaks in this survey area are toyon, oleander, hollyleaf cherry, quailbush, and pyracantha. Suitable trees for use in windbreaks are Arizona cypress, black locust, eldarica pine, Athel, river she-oak, red gum, and manna gum. Actual selection of species should be based on site requirements.

Additional information on planning windbreaks and environmental plantings and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service, the Cooperative Extension Service, and the California Department of Forestry.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey; for example, interpretations for dwellings without basements and for local roads and streets in table 10 and interpretations for septic tank absorption fields in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They

have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

By Larry H. Norris, biologist, Soil Conservation Service

Fish and wildlife are valuable resources in the survey area. They improve the quality of the environment, act as early indicators of environmental pollution, and provide numerous opportunities for recreation. Wildlife-related activities, such as nature study, bird watching, hunting, and fishing, have an effect on the area's economy. Many types of wildlife are important in the natural control of weeds, insects, and animal pests.

Warmwater fish, including largemouth bass, smallmouth bass, black crappie, catfish, and sunfish, inhabit the rivers and ponds of the area. In addition to fish habitat, the rivers, creeks, and drainageways also provide important corridors of riparian habitat for mammals, birds, reptiles, amphibians, and insects. In the areas developed for intensive agriculture, these riparian corridors often account for the only perennial wildlife habitat left. Although the value of these areas to wildlife cannot be overemphasized for the purpose of this survey, some have not been separated out as detailed soil map units because of their small size.

The San Luis National Wildlife Refuge, Kesterson National Wildlife Refuge, Los Banos and Volta State Waterfowl Management Areas, and privately owned duck clubs in the survey area provide important habitat for migrating winter waterfowl in the Pacific waterfowl migration flyway. These areas account for about 66,314 acres of natural marshland vegetation.

Man's activities have had various effects on wildlife populations. Many species, such as coyotes, blackbirds, and ground squirrels, can actually thrive in close association with man. In contrast, the existence of some species has been threatened by man's activities. Some of these species, considered to be threatened, rare, or endangered, are present in the survey area. The endangered San Joaquin kit fox lives mainly in the vegetated areas of the San Joaquin Valley floor and foothills. Conversion of valley land to irrigated farmland is reducing the range of this fox and confining it to valley areas that are unsuited to farming and to rolling foothills and canyons. Two other endangered species that occur in the survey area are the blunt-nosed leopard lizard and the California condor. Populations of each of these species are on the decline because of loss of natural habitat.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, irrigation, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses

and legumes are fescue, orchardgrass, wheatgrass, clover, trefoil, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, vetch, filaree, soft chess, and wild oat.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, cottonwood, alder, California bay, buckeye, sycamore, dogwood, and Athel.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are chamise, manzanita, snowberry, California sage, snowberry, big sagebrush, quailbush, and California buckwheat.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, saltgrass, rushes, sedges, and cattails.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include California valley quail, pheasant, meadowlark, field sparrow, cottontail, and coyote.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants, or both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, squirrels, raccoon, California mule deer, and bobcat.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, northern harrier, muskrat, and garter snake.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include meadowlark, horned lark, golden eagle, red-tailed hawk, California mule deer, and wild pig.

Additional information on wildlife habitat is presented in the section "General Soil Map Units."

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water

table, slope, likelihood of flooding, and natural soil structure aggregation. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps and soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil

limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage because of rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material

during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of

less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed

waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added; for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials *(1)* and the Unified soil classification system *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification; for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on

laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average rate of soil blowing or water erosion that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

The risk of soil blowing is based on the soil properties that affect the soil's resistance to soil blowing when cultivated. The percentage of dry aggregates larger than 0.84 millimeters after tillage is used to determine how erodible the soil is. Those soils having less than 40 percent of these aggregates are considered to be susceptible to soil blowing. This relates to the risk of losing or moving as much as 86 tons of soil material per acre per year. In these areas care should be taken to keep the surface of the soil protected during the windy season. The soils in this survey area that are susceptible to soil blowing are Bisgani loamy sand, partially drained (map unit 137) and Edminster Variant sand (map unit 177).

In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sand or gravelly sand. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potenital) when thoroughly wet. These consist chiefly of clay that has high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered to be flooding. Standing water in swamps and marshes or in closed depressional areas is considered to be ponding.

Table 16 gives the estimated frequency of flooding. Frequency is expressed as *none, rare, occasional,* and *frequent*. *None* means that flooding is not probable, *rare* that it is unlikely but is possible under unusual weather conditions (chance of flooding in any year is 0 to 5 percent), *occasional* that it occurs infrequently under normal weather conditions (chance of flooding in any year is 5 to 50 percent), and *frequent* that it occurs often under normal weather conditions (chance of flooding in any year is more than 50 percent).

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific

than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, *perched, artesian,* or *apparent*; and the months of the year that the water table usually is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower water table by a dry zone.

The two numbers in the column "High water table" indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A cemented pan is a cemented or indurated subsurface layer at a depth of 5 feet or less. Such a pan causes difficulty in excavation. Pans are classified as thin or thick. A *thin* pan is one that is less than 3 inches thick if continuously indurated or less than 18 inches thick if discontinuous or fractured. Excavations can be made by trenching machines, backhoes, or small rippers. A *thick* pan is one that is more than 3 inches thick if continuously indurated or more than 18 inches thick if it is discontinuous or fractured. Such a pan is so thick or massive that blasting or special equipment is needed in excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquept (*Aqu*, meaning water, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquept (*Hapl*, meaning minimal horizonation, plus *aquept*, the suborder of the Inceptisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, available water, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed (calcareous), thermic Typic Haplaquepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (11)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (14)*. Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the unit.

The map units of each taxonomic unit are described in the section "Detailed Soil Map Units."

Agnal Series

The Agnal series consists of very deep, very poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. They have a very high concentration of salts and sodium. Slope is 0 to 2 percent.

Soils of the Agnal series are fine, montmorillonitic, thermic Cumulic Haplaquolls.

Typical pedon of Agnal clay loam, about 4.5 miles northeast of the city of Gustine, in Kesterson National Wildlife Refuge; 1,200 feet east and 1,400 feet north of the southwest corner of sec. 31, T. 7 S., R. 10 E., Gustine Quadrangle.

A11sa—0 to 2 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; strong thin platy structure; slightly hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 35 percent clay; electrical conductivity is 90 millimhos per centimeter; exchangeable sodium percentage is 38; neutral; abrupt smooth boundary.

A12sa—2 to 5 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) moist; strong medium angular blocky structure; hard, friable, sticky and very plastic; few very fine roots; few very fine tubular pores; common thin and many moderately thick pressure faces; 4.8 percent organic matter; 45 percent clay; moderately alkaline; clear smooth boundary.

ACsa—5 to 9 inches; dark gray (10YR 4/1) and very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; light gray (10YR 7/2) salt specks; strong coarse angular blocky structure; hard, friable, sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many thin and common moderately thick pressure faces; 3.1 percent organic matter; 47 percent clay; electrical conductivity is 48 millimhos per centimeter; exchangeable sodium percentage is 43; 3 percent salt specks; strongly alkaline; clear smooth boundary.

C1sa—9 to 17 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; common medium prominent grayish brown (2.5Y 5/2) mottles when moist; white (10YR 8/1) salt streaks; moderate coarse angular blocky structure; hard, friable, very sticky and very plastic; few very fine, medium, and coarse roots; few very fine tubular pores; many thin and common moderately thick pressure faces; 45 percent clay; 7 percent salt streaks; strongly alkaline; gradual smooth boundary.

C2sa—17 to 31 inches; very dark gray (10YR 3/1) clay, black (N 2/0) moist; common medium prominent grayish brown (2.5Y 5/2) mottles when moist; black (N 2/0) concretions; white (2.5Y 8/0) salt streaks; weak coarse and very coarse angular blocky structure; hard, very friable, very sticky and plastic; few very fine and medium roots; few very fine tubular pores; many thin and common moderately thick pressure faces; 1.9 percent organic matter; 41 percent clay; 17 percent salt streaks; strongly alkaline; diffuse wavy boundary.

IIC3—31 to 61 inches; black (10YR 2/1) clay, black (5Y 2.5/1) moist; common medium prominent grayish brown (2.5Y 5/2) mottles when moist; white (5Y 8/1) salt streaks; weak medium prismatic structure; hard, friable, sticky and very plastic; few very fine roots; common very fine tubular pores; many moderately thick pressure faces; 48 percent clay; electrical conductivity is 33 millimhos per centimeter; exchangeable sodium percentage is 35; 15 percent salt streaks; slightly effervescent; disseminated lime; strongly alkaline.

In most years the entire profile is saturated from October to March by a water table and stagnant surface water. The textural control section is 35 to 50 percent clay. The salt content is 2.0 to 7.5 percent in the upper 31 inches of the salic horizon. The electrical conductivity is 28 to 100 millimhos per centimeter in the upper 31 inches. The exchangeable sodium percentage is 20 to 50. The organic matter content is 1 to 5 percent in the upper 31 inches, and it decreases regularly with increasing depth.

Some pedons do not have an A11sa horizon. The lower part of the A horizon has color of 10YR 2/1, 3/1, or 4/1 or of 2.5Y 4/2 or 5/1. Moist color is 10YR 2/1, 3/1, 3/2, or 4/2; 2.5Y 3/2; or 5Y 3/1 or 3/2. The lower part of the A horizon is clay loam or clay and is moderately alkaline or strongly alkaline.

The upper part of the C horizon has color of 10YR 3/1 or 4/1 or of 2.5Y 4/2, 5/2, or 5/4. Moist color is 10YR 2/1, 2/2, 3/1, or 3/3; N 2/0; 2.5Y 5/2; or 5Y 3/1, 3/2, or 3/3. Mottles when moist are few, fine or medium, and prominent and have color of 7.5YR 3/2, 3/4, 5/6, or 5/8 or of 10YR 4/4, 4/6, or 5/4; are common, medium, and prominent and have color of 2.5Y 5/2; or are few, fine, and distinct and have color of 5Y 3/1 or 5/2 or of N 3/0. The upper part of the C horizon is clay loam or clay and is moderately alkaline or strongly alkaline.

The lower part of the C horizon has color of 10YR 2/1; 2.5Y 4/2, 5/2, or 5/4; or 5Y 4/2 or 4/3. Moist color is 10YR 4/4; 2.5Y 4/2, 4/4, or 5/4; 5Y 2.5/1, 4/2, 4/3, 5/2,

or 5/3; or 5GY 4/1, 6/1, or 6/3. Mottles when moist are common, fine, and prominent and have color of 2.5YR 4/6; are few, fine, and prominent and have color of 7.5YR 5/8; or are common, medium, and prominent and have color of 2.5Y 5/0, 5Y 5/2, 5BG 5/1, or N 2/0. The lower part of the C horizon is clay loam or clay. It is noneffervescent or slightly effervescent and is mildly alkaline to strongly alkaline.

Akad Series

The Akad series consists of moderately deep, somewhat excessively drained soils on foothills. These soils formed in residuum derived from mixed conglomerate. Slope is 30 to 50 percent.

Soils of the Akad series are loamy-skeletal, mixed, thermic Mollic Haploxeralfs.

Typical pedon of an Akad sandy clay loam in an area of Akad-Conosta association, 30 to 50 percent slopes, about 4.5 miles west of the community of Santa Nella; 1,800 feet south and 1,600 feet east of the southwest corner of sec. 33, T. 9 S., R. 8 E., San Luis Dam Quadrangle.

A1—0 to 3 inches; brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate fine and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular and interstitial pores; 10 percent gravel; slightly acid; clear smooth boundary.

B1t—3 to 6 inches; dark reddish brown (5YR 3/4) gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; strong medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; 30 percent gravel; continuous thin clay films on peds and bridging sand grains; neutral; clear wavy boundary.

B21t—6 to 10 inches; dark reddish brown (5YR 3/4, dry or moist) very gravelly sandy clay loam; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; many thin clay films on peds and bridging sand grains; 55 percent gravel 15 to 50 millimeters in diameter; neutral; clear smooth boundary.

B22t—10 to 17 inches; dark red (2.5YR 3/6) extremely gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable, slightly sticky and plastic; common very fine roots; few very fine tubular pores; many thin clay films on peds and bridging sand grains; 75 percent gravel 15 to 50 millimeters in diameter; neutral; clear wavy boundary.

C—17 to 24 inches; reddish brown (5YR 4/4) extremely gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; 80 percent gravel 15 to 75 millimeters in diameter; neutral; abrupt irregular boundary.

R—24 inches; sandstone conglomerate.

The solum is 10 to 17 inches thick. Depth to sandstone conglomerate is 20 to 30 inches. Clay content is 20 to 30 percent in the A horizon and 27 to 35 percent in the Bt horizon. The clay content in the Bt horizon is at least 1.2 times that of the A horizon. In some pedons as much as 80 percent of the surface is covered with gravel and cobbles 25 to 150 millimeters in diameter.

The A horizon has color of 7.5YR 3/4 or 4/4 or of 10YR 4/3. Moist color is 7.5YR 3/4 or 10YR 3/4. Organic matter content is 1 to 2 percent. Reaction is slightly acid to mildly alkaline.

The Bt horizon has color of 2.5YR 3/6; 5YR 3/4; 7.5YR 4/6 or 5/6; or 10YR 4/4. Moist color is 2.5YR 3/4; 5YR 3/4 or 4/4; 7.5YR 3/4; or 10YR 3/4. The Bt horizon is gravelly to extremely gravelly. Gravel content is 30 to 75 percent.

The C horizon has color of 5YR 4/4, 7.5YR 3/4, or 10YR 4/3. Moist color is 5YR 3/4, 7.5YR 4/6, or 10YR 4/4.

Alros Series

The Alros series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. They commonly have been altered by land leveling. The soils have a high percentage of exchangeable sodium. Slope is 0 to 2 percent.

Soils of the Alros series are fine-loamy, mixed (calcareous), thermic Typic Haplaquepts.

Typical pedon of Alros clay loam, partially drained, about 6 miles east-northeast of the city of Los Banos; 1,400 feet north and 900 feet west of the southeast corner of sec. 3, T. 10 S., R. 11 E., Delta Ranch Quadrangle.

Ap—0 to 12 inches; dark gray (5Y 4/1) and gray (5Y 5/1) clay loam, dark gray (5Y 4/1) moist; moderate medium granular structure; hard, friable, very sticky and plastic; few very fine roots; few very fine tubular

and interstitial pores; slightly effervescent; lime is disseminated and is segregated as few irregular soft masses; exchangeable sodium percentage is 14; moderately alkaline; abrupt smooth boundary.

C1—12 to 23 inches; light olive gray (5Y 6/2) clay loam, olive (5Y 4/3) moist; few fine prominent light gray (10YR 7/2) mottles, yellowish brown (10YR 5/8) and light gray (10YR 7/2) moist; weak medium angular blocky structure; hard, friable, sticky and plastic; few very fine tubular and interstitial pores; few thin clay films on peds; slightly effervescent; lime is disseminated and is segregated as few medium irregular soft masses; 9 percent calcium carbonate equivalent; exchangeable sodium percentage is 29; moderately alkaline; abrupt wavy boundary.

IIC2ca—23 to 31 inches; white (10YR 8/1) and very pale brown (10YR 7/4) clay loam, pale yellow (5Y 7/3) and pale olive (5Y 6/4) moist; massive; hard, friable, sticky and plastic, few very fine tubular pores; violently effervescent; lime is disseminated and is segregated as many fine and medium irregular soft masses; 48 percent calcium carbonate equivalent; exchangeable sodium percentage is 40; strongly alkaline; abrupt wavy boundary.

IIIC3ca—31 to 39 inches; light gray (2.5Y 7/2) clay loam, olive (5Y 5/3) moist; common medium prominent brownish yellow (10YR 6/6) and white (10YR 8/1) mottles, yellowish brown (10YR 5/8) and light gray (10YR 7/2) moist; massive; hard, friable, very sticky and plastic; common very fine and fine tubular pores; many thin clay films lining pores and staining mineral grains; strongly effervescent; lime is disseminated and is segregated as common medium irregular soft masses; 42 percent calcium carbonate equivalent; exchangeable sodium percentage is 38; strongly alkaline; abrupt wavy boundary.

IIIC4—39 to 60 inches; pale olive (5Y 6/3) clay loam, greenish gray (5GY 5/1) moist; many large prominent light gray (10YR 7/1) and brownish yellow (10YR 6/6) mottles yellowish brown (10YR 5/8) and light gray (10YR 7/2) moist; massive; slightly hard, friable, very sticky and plastic; common very fine tubular pores; many thin clay films lining pores and staining mineral grains; strongly effervescent; lime is disseminated and is segregated as common medium irregular masses; 23 percent calcium carbonate equivalent; exchangeable sodium percentage is 42; strongly alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. Depth to the upper boundary of the calcic horizon is 18 to 27 inches. The calcium carbonate equivalent in the calcic horizon is 20 to 50 percent. The exchangeable sodium percentage below a depth of 12 inches is 15 to 42 percent, and it increases with increasing depth or remains the same. The 10- to 40-inch control section averages 18 to 35 percent clay. Organic matter content is less than 1 percent.

The A horizon has color of 10YR 4/1, 4/2, or 5/1; 2.5Y 4/2 or 5/2; or 5Y 4/1 or 5/1. Moist color is 10YR 2/2, 3/1, 3/2, or 4/2; 2.5Y 3/2, 4/2, or 5/2; or 5Y 3/1, 3/2, or 4/1. The A horizon is mildly alkaline to strongly alkaline and is noncalcareous in some pedons.

The upper part of the C horizon has color of 10YR 7/4 or 8/1, 2.5Y 7/2, or 5Y 6/2, depending on the content of lime. Moist color is 10YR 5/3, 5/6, 7/4, or 8/1; 2.5Y 5/2 or 6/2; or 5Y 4/3, 5/3, 6/2, 6/4, 7/2, 7/3, or 8/2. The upper part of the C horizon is loam, sandy clay loam, or clay loam.

The lower part of the C horizon has color of 2.5Y 5/2 or 6/2 or of 5Y 6/3. Moist color is 10YR 5/4, 2.5Y 6/4, or 5GY 5/1. The lower part of the C horizon is stratified sandy loam, silt loam, sandy clay loam, or clay loam and is 15 to 35 percent clay. In some areas strata that are 3 to 8 inches thick and are 2 to 12 percent durinodes are below a depth of 31 inches.

In some pedons the C horizon is noncalcareous.

The Alros soils in map unit 104 do not meet the requirements for a calcic horizon and have an A horizon that is as much as 17 inches thick. These differences are outside the range for the series; however, they do not significantly affect the use and management of the soils.

Altamont Variant

The Altamont Variant consists of deep, well drained soils on mountains. These soils formed in material weathered from basic volcanic rock. Slope is 30 to 50 percent.

Soils of the Altamont Variant are fine, montmorillonitic, thermic Typic Chromoxererts.

Typical pedon of an Altamont Variant clay in an area of Altamont Variant-Hytop complex, 30 to 50 percent slopes, about 22 miles west-southwest of the city of Los Banos; 3,000 feet west and 200 feet south of the northeast corner of sec. 32, T. 11 S., R. 7 E., Mariposa Peak Quadrangle.

A11—0 to 9 inches; very dark gray (10YR 3/1) clay, very dark grayish brown (10YR 3/2) moist; strong coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; few very fine tubular pores; many thick pressure faces; 0.91 percent organic matter; neutral; clear smooth boundary.

A12—9 to 21 inches; very dark gray (10YR 3/1) clay, very dark brown (10YR 2/2) moist; strong medium and coarse prismatic structure; hard, firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; many thick pressure faces; many intersecting slickensides; 0.85 percent organic matter; neutral; gradual smooth boundary.

AC—21 to 29 inches; very dark grayish brown (10YR 3/2) and yellowish brown (10YR 5/4) clay, very dark brown (10YR 2/2) and dark brown (10YR 3/3) moist; weak medium prismatic structure; hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; many thick pressure faces; mildly alkaline; gradual smooth boundary.

C—29 to 42 inches; olive brown (2.5Y 4/4) clay, dark brown (10YR 3/3) and very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; hard, friable, sticky and very plastic; few very fine roots; few very fine tubular pores; mildly alkaline; abrupt irregular boundary.

Cr—42 to 47 inches; strongly weathered basalt; clear wavy boundary.

R—47 inches; slightly weathered basalt.

Depth to a paralithic contact is 40 to 50 inches. Cracks 1.0 to 2.5 centimeters wide extend to a depth of 20 inches or more when the soil is dry. The cracks are 2 to 8 centimeters wide at the surface. The A12 and AC horizons have intersecting slickensides and sphenoids. The profile is neutral to moderately alkaline and is as much as 5 percent gravel 2 to 50 millimeters in diameter throughout.

The A1 horizon has color of 10YR 3/1, 3/2, 4/1, or 4/2 or of 2.5Y 3/2 or 4/2. Moist color is 10YR 2/2, 3/1, or 3/2 or 2.5Y 3/2. The horizon is 45 to 55 percent clay.

The C horizon has color of 10YR 4/2, 4/3, 4/4, 5/2, 5/3, or 5/4 or of 2.5Y 4/2, 4/4, 5/2, or 5/4. Moist color is 10YR 3/2, 3/3, 3/4, 4/2, 4/3, or 4/4 or 2.5Y 3/2, 4/2, or 4/4. The horizon is clay loam or clay and is 35 to 50 percent clay.

Anela Series

The Anela series consists of very deep, well drained soils on flood plains and stream terraces. These soils formed in mixed gravelly alluvium derived dominantly from sedimentary rock. Slope is 0 to 15 percent.

Soils of the Anela series are loamy-skeletal, mixed, thermic Cumulic Haploxerolls.

Typical pedon of Anela very gravelly sandy loam, 2 to 8 percent slopes, 13 miles west-northwest of the city of Los Banos; about 1,800 feet north and 700 feet west of the southeast corner of sec. 27, T. 9 S., R. 8 E., San Luis Dam Quadrangle.

Ap—0 to 6 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, firm, nonsticky and slightly plastic; common very fine roots; common very fine tubular pores; 45 percent gravel 2 to 25 millimeters in diameter; slightly acid; abrupt smooth boundary.

A12—6 to 12 inches; brown (10YR 4/3) very gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, nonsticky and slightly plastic; common very fine roots; common very fine tubular pores; 40 percent gravel 2 to 25 millimeters in diameter; neutral; gradual smooth boundary.

B1t—12 to 18 inches; brown (10YR 4/3) very gravelly loam, very dark brown (10YR 2/2) moist; weak medium and coarse subangular blocky structure; hard, friable, nonsticky and slightly plastic; common very fine roots; common very fine tubular pores; 40 percent gravel 2 to 25 millimeters in diameter; very few thin clay films bridging sand grains; neutral; clear smooth boundary.

B21t—18 to 32 inches; dark brown (7.5YR 4/2) extremely gravelly sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; few very fine tubular pores; common thin clay films bridging sand grains and few thin clay films on peds and in pores; 70 percent gravel 2 to 25 millimeters in diameter and cobbles 75 to 150 millimeters in diameter; neutral; clear smooth boundary.

B22t—32 to 42 inches; dark brown (7.5YR 4/2) extremely gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; few very fine tubular pores; common thin clay films bridging sand grains and few thin clay films on peds and in pores; 60 percent gravel 2 to 25 millimeters in diameter; moderately alkaline; clear smooth boundary.

IIC1—42 to 60 inches; dark brown (7.5YR 4/2) extremely gravelly loamy coarse sand, dark brown (7.5YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores; common moderately thick clay films on rock fragments; 60 percent gravel 2 to 25 millimeters in diameter, moderately alkaline.

The A horizon is 15 to 60 percent gravel, the B horizon is 45 to 70 percent gravel and cobbles, and the C horizon is 60 to 70 percent gravel and cobbles. Clay content of the B horizon is less than 1.2 times that of the A horizon.

The A horizon has color of 10YR 4/3, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The horizon is gravelly loam or very gravelly sandy loam and is 10 to 27 percent clay. Organic matter content is 1 to 3 percent, and it decreases irregularly with increasing depth.

The B horizon has color of 7.5YR 4/2 or 10YR 4/3. The fine earth fraction is stratified loam, sandy loam, sandy clay loam, or clay loam and is very gravelly or extremely gravelly. Clay content is 15 to 35 percent. The B horizon is neutral to moderately alkaline.

The fine earth fraction of the C horizon is loamy coarse sand, sandy loam, or sandy clay loam and is extremely gravelly. Clay content is 5 to 30 percent.

Apollo Series

The Apollo series consists of deep, well drained soils on low foothills adjacent to the San Joaquin Valley. These soils formed in material weathered from soft, calcareous shale or sandstone. Slope is 2 to 30 percent.

Soils of the Apollo series are fine-loamy, mixed, thermic Calcic Haploxerolls.

Typical pedon of Apollo clay loam, 2 to 8 percent slopes, about 6 miles west-southwest of the city of Los Banos; 1,300 feet north and 300 feet west of the southeast corner of sec. 27, T. 10 S., R. 9 E., Volta Quadrangle.

Ap—0 to 10 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; weak medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; 1.2 percent organic matter; 20 percent calcium carbonate equivalent; strongly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

B1—10 to 18 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 30 percent calcium carbonate equivalent; strongly effervescent; lime is disseminated and is segregated as common fine irregular filaments; moderately alkaline; clear wavy boundary.

B21t—18 to 31 inches; pale brown (10YR 6/3) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine and few fine tubular pores; few thin clay films in pores; violently effervescent; lime is disseminated and is segregated as common fine irregular filaments and soft masses; moderately alkaline; clear wavy boundary.

B22t—31 to 41 inches; pale brown (10YR 6/3) and brown (10YR 5/3) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine and few fine tubular pores; few thin clay films in pores; 34 percent calcium carbonate equivalent; violently effervescent; lime is disseminated and is segregated as few fine irregular soft masses; moderately alkaline; abrupt wavy boundary.

C1r—41 to 50 inches; yellow (10YR 7/6), soft, coarse-grained shale with plates inclined at 15 degrees to the surface, brownish yellow (10YR 6/6) moist; 68 percent calcium carbonate equivalent.

C2r—50 to 64 inches; light yellowish brown (10YR 6/4), soft, coarse-grained shale with plates inclined at 15 degrees to the surface, olive brown (2.5Y 4/4) moist.

Depth to soft, calcareous shale or sandstone is 40 to 60 inches. The particle size control section is 27 to 35 percent clay; it has less than 1.2 times more clay than the A horizon. About 25 to 50 percent of the original surface layer has been lost through erosion.

The A horizon has color of 10YR 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3. The horizon is mildly alkaline or moderately alkaline. Organic matter content is 1 to 2 percent. Calcium carbonate equivalent is 10 to 25 percent.

The upper part of the B horizon has color of 10YR 5/4, 5/6, 6/3, or 6/4 or of 7.5YR 5/6 or 6/6. Moist color is 10YR 4/3, 4/4, 4/6, 5/5, or 5/6 or 7.5YR 3/4, 4/6, or 5/6. The upper part of the B horizon is clay loam or silty clay loam. It has clay films in some pedons. Organic matter content is less than 1 percent.

The lower part of the B horizon has color of 10YR

4/4, 5/3, 5/4, 5/6, 6/3, or 6/4 or of 7.5YR 4/4, 5/6, or 6/6. Moist color is 10YR 4/4, 4/6, 5/4, or 5/6 or 7.5YR 3/4, 4/4, 4/6, or 5/6. The lower part of the B horizon is clay loam or silty clay loam. It has as much as 5 percent soft lime masses and has a calcium carbonate equivalent of 20 to 35 percent.

The Cr horizon is calcareous, strongly weathered, soft or very soft, coarse-grained shale or fine-grained sandstone.

Ararat Series

The Ararat series consists of deep, well drained soils on mountains. These soils formed in material weathered from volcanic tuff conglomerate. Slope is 5 to 75 percent.

Soils of the Ararat series are loamy-skeletal, mixed, thermic Pachic Ultic Haploxerolls.

Typical pedon of an Ararat extremely stony loam in an area of Ararat-Peckham complex, 8 to 30 percent slopes, about 20 miles southwest of the city of Los Banos; 2,800 feet west and 2,300 feet south of the northeast corner of sec. 29, T. 12 S., R. 8 E. (projected section lines from sec. 5, T. 13 S., R. 8 E.), Ruby Canyon Quadrangle.

A1—0 to 7 inches; brown (10YR 4/3) extremely stony loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common very fine roots; common very fine and few fine and medium tubular pores; 15 percent stones, 5 percent cobbles, and 5 percent boulders; 2 percent organic matter; medium acid; clear smooth boundary.

A3—7 to 24 inches; reddish brown (5YR 4/3) very stony loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; few very fine and common fine and medium tubular pores; 40 percent stones and cobbles; 1.2 percent organic matter; slightly acid; gradual smooth boundary.

Bt—24 to 45 inches; reddish brown (5YR 4/3) extremely stony sandy clay loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, sticky and plastic; few fine, medium, and coarse roots; few fine and medium tubular pores; few moderately thick clay films in pores and bridging sand grains; 65 percent stones and cobbles; 0.4 percent organic matter; neutral; abrupt smooth boundary

R—45 inches; fractured volcanic tuff conglomerate.

Depth to volcanic tuff conglomerate is 40 to 50 inches. Stones and boulders cover 15 to 30 percent of the soil surface. The upper 20 inches of the profile is 1 to 4 percent organic matter. Some pedons have a thin C horizon. Base saturation (sum of cations) is 50 to 75 percent to a depth of 30 inches or more.

The A horizon has color of 5YR 4/3; 7.5YR 5/2, 5/3, or 5/4; or 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Moist color is 5YR 3/3, 7.5YR 3/2, or 10YR 3/2 or 3/3. The horizon is extremely stony loam in the upper part and very stony loam, very bouldery loam, or very stony sandy clay loam in the lower part. It is 16 to 26 percent clay and 15 to 30 percent cobbles, stones, and boulders. Reaction is medium acid or slightly acid.

The B horizon has color of 5YR 4/3; 7.5YR 4/3, 4/4, or 5/4; or 10YR 4/3, 5/2, or 5/3. Moist color is 5YR 3/3, 7.5YR 3/2 or 3/4, or 10YR 3/3 or 4/2. The horizon is very stony or extremely stony sandy clay loam, very bouldery or extremely bouldery sandy clay loam, or very stony or extremely stony loam. It is 18 to 26 percent clay, 50 to 75 percent cobbles, stones, and boulders, and 0 to 10 percent gravel. Reaction is slightly acid or neutral.

Arbuckle Variant

The Arbuckle Variant consists of very deep, well drained soils on low valley terraces. These soils formed in gravelly alluvium derived from various kinds of rock. Slope is 0 to 2 percent.

Soils of the Arbuckle Variant are fine-loamy, mixed, thermic Typic Haploxeralfs.

Typical pedon of Arbuckle Variant sandy loam, 1.2 miles east of the community of Santa Nella; about 1,100 feet east and 500 feet south of the northwest corner of sec. 4, T. 10 S., R. 9 E., Volta Quadrangle.

Ap—0 to 7 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; few very fine tubular pores; 10 percent gravel 2 to 20 millimeters in diameter; neutral; clear smooth boundary.

A12—7 to 19 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine roots; common very fine and few fine tubular pores; many thin clay films bridging sand grains; 8 percent gravel 2 to 30

millimeters in diameter; neutral; clear wavy boundary.

IIB21t—19 to 25 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; common very fine and few fine tubular pores; many thick clay films on peds; 25 percent gravel 2 to 30 millimeters in diameter; mildly alkaline; clear smooth boundary.

IIB22t—25 to 37 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; many moderately thick clay films bridging sand grains; 30 percent gravel 2 to 80 millimeters in diameter; moderately alkaline; clear smooth boundary.

IIC1—37 to 47 inches; strong brown (7.5YR 5/6) very gravelly loamy coarse sand, brown (7.5YR 5/4) moist; few fine prominent olive (5Y 5/3) mottles when moist; single grain; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; 40 percent gravel 2 to 80 millimeters in diameter; moderately alkaline; clear smooth boundary.

IIC2—47 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loamy coarse sand, brown (7.5YR 5/4) and yellowish brown (10YR 5/4) moist; single grain; soft loose, nonsticky and nonplastic; no roots; few very fine interstitial pores; 35 percent gravel 2 to 80 millimeters in diameter; moderately alkaline.

Thickness of the solum is 32 to 50 inches. Gravel content is 5 to 15 percent in the A horizon, 25 to 35 percent in the B horizon, and 35 to 50 percent in the C horizon.

The A horizon has color of 10YR 5/3, 6/3, or 6/4. Moist color is 10YR 3/3, 4/3, or 4/4. The horizon is 12 to 20 percent clay. Reaction is neutral or mildly alkaline.

The B horizon has color of 7.5YR 5/4 or 5/6. Moist color is 7.5YR 4/4 or 5/6. The horizon is gravelly sandy clay loam or gravelly loam and is 18 to 25 percent clay. Reaction is mildly alkaline or moderately alkaline.

The C horizon has color of 10YR 6/4 or 6/6 or of 7.5YR 5/4, 5/6, or 6/4. Moist color is 10YR 5/4 or 5/6 or 7.5YR 4/4, 4/6, or 5/4. Reaction is mildly alkaline or moderately alkaline.

Arburua Series

The Arburua series consists of moderately deep, well drained soils on foothills. These soils formed in material weathered from shale or sandstone. Slope is 2 to 75 percent.

Soils of the Arburua series are fine-loamy, mixed (calcareous), thermic Typic Xerorthents.

Typical pedon of Arburua loam, 15 to 30 percent slopes, about 11 miles south-southwest of the city of Los Banos; 1,400 feet north and 300 feet east of the southwest corner of sec. 2, T. 12 S., R. 9 E., Ortigalita Peak Northwest Quadrangle.

A11—0 to 4 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; soft, friable, sticky and plastic; many very fine roots; few very fine, fine, and medium tubular pores; violently effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; clear smooth boundary.

A12—4 to 10 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, sticky and plastic; common very fine roots; common very fine, fine, and medium tubular pores; violently effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; gradual smooth boundary.

C1—10 to 17 inches; pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, sticky and plastic; common very fine roots; few very fine, fine, and medium tubular pores; violently effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; clear smooth boundary.

C2—17 to 27 inches; brown (10YR 5/3) loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, sticky and plastic; few very fine roots; few very fine and fine tubular pores; violently effervescent; lime is disseminated and is segregated as few fine and medium soft masses; moderately alkaline; abrupt irregular boundary.

Cr—27 to 32 inches; strongly weathered, calcareous shale.

R—32 inches; hard, nonfractured, calcareous shale.

The profile is 20 to 40 inches deep to a paralithic contact and is 24 to 41 inches deep to a lithic contact. About 25 to 75 percent of the original surface has been lost through erosion.

The A horizon has color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/3 or of 2.5Y 5/3. Moist color is 10YR 4/3 or 2.5Y 4/4. The horizon is 18 to 27 percent clay. Organic matter

content is less than 1 percent. The horizon is strongly effervescent or violently effervescent. Some pedons do not have soft masses of lime. Content of soft, weathered, angular sandstone or shale fragments 2 to 70 millimeters in diameter is 0 to 10 percent.

The C horizon has color of 10YR 5/3 or 6/3 or of 2.5Y 6/4. Moist color is 10YR 4/3, 4/4, 5/3, or 5/4 or 2.5Y 4/4. The horizon is loam or clay loam and is 18 to 30 percent clay. Soft lime masses are few or common. The C horizon is as much as 15 percent soft, weathered, angular sandstone or shale fragments that occur throughout the horizon or in layers.

Asolt Series

The Asolt series consists of deep, well drained soils on mountains. These soils formed in residuum derived from basic volcanic rock. Slope is 15 to 50 percent.

Soils of the Asolt series are fine, montmorillonitic, thermic Typic Chromoxererts.

Typical pedon of Asolt very stony clay, 30 to 50 percent slopes, about 14 miles west of the city of Los Banos, on the southwestern side of Basalt Hill; 2,300 feet west and 1,200 feet north of the southeast corner of sec. 33, T. 10 S., R. 8 E., San Luis Dam Quadrangle.

A11—0 to 3 inches; dark reddish gray (5YR 4/2) very stony clay, dark reddish brown (5YR 3/3) moist; strong medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; 20 percent cobbles and 10 percent stones; slightly effervescent; disseminated lime; 2.2 percent organic matter; moderately alkaline; clear wavy boundary.

A12—3 to 20 inches; dark reddish brown (5YR 3/2) cobbly clay, dark reddish brown (5YR 3/3) moist; strong coarse and very coarse angular blocky and prismatic structure; very hard, friable, sticky and very plastic; many very fine roots concentrated along vertical faces of peds; few very fine tubular pores; 20 percent cobbles and 10 percent stones; slightly effervescent; disseminated lime; 1.8 percent organic matter; moderately alkaline; clear wavy boundary.

A13—20 to 29 inches; dark reddish gray (5YR 4/2) cobbly clay, reddish brown (5YR 4/3) moist; strong coarse and very coarse prismatic structure; very hard, friable, sticky and very plastic; few very fine roots; common very fine tubular pores; 20 percent cobbles and 10 percent stones; strongly effervescent; disseminated lime; moderately alkaline; clear irregular boundary.

C—29 to 42 inches; brown (7.5YR 5/4) cobbly clay, brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; very hard, friable, sticky and plastic; no roots; few very fine tubular pores; 20 percent cobbles and 10 percent stones; common moderately thick pressure faces; violently effervescent; disseminated lime; moderately alkaline; clear irregular boundary.

R—42 inches; basalt.

Depth to basalt is 40 to 60 inches. Cracks 1 to 2 centimeters wide extend to a depth of 20 inches; the cracks are 2 to 5 centimeters wide at the surface. The profile is 40 to 60 percent clay, 20 to 35 percent cobbles and stones, and 0 to 5 percent gravel. Reaction is neutral to moderately alkaline. From 0 to 35 percent of the surface is covered with cobbles and 5 to 15 percent is covered with stones.

The A horizon has color of 5YR 3/2, 4/2, or 4/3; 7.5YR 3/4; or 10YR 4/1 or 4/2. Moist color is 5YR 3/2, 3/3, or 4/3; 7.5YR 4/4 or 4/6; or 10YR 3/2 or 4/2. Organic matter content is 1 to 3 percent.

The C horizon has color of 5YR 4/3 or 4/4 or of 7.5YR 5/4 or 5/6. Moist color is 5YR 3/4, 4/4, or 5/3 or 7.5YR 4/4.

Ayar Series

The Ayar series consists of deep, well drained soils on foothills. These soils formed in material weathered from calcareous shale and sandstone. Slope is 5 to 50 percent.

Soils of the Ayar series are fine, montmorillonitic, thermic Typic Chromoxererts.

Typical pedon of Ayar clay, 30 to 50 percent slopes, about 4.5 miles south of the community of Santa Nella; 2,400 feet north and 2,100 feet east of the southwest corner of sec. 29, T. 10 S., R. 9 E., San Luis Dam Quadrangle.

A11—0 to 5 inches; grayish brown (10YR 5/2) clay, dark brown (10YR 3/3) moist; strong coarse prismatic structure parting to strong medium and coarse angular blocky; very hard, firm, very sticky and plastic; common very fine roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

A12—5 to 15 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; strong coarse prismatic structure parting to strong medium and coarse angular blocky; very hard, firm, sticky and plastic; common very fine roots; few very fine

tubular pores; common weak intersecting slickensides; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

A13—15 to 26 inches, grayish brown (2.5Y 5/2) and light yellowish brown (10YR 6/4) clay, dark grayish brown (2.5Y 4/2) and yellowish brown (10YR 5/4) moist; strong coarse prismatic structure parting to strong medium and coarse angular blocky; very hard, firm, sticky and very plastic; common very fine roots; few very fine tubular pores; common moderate wedge-shaped structural aggregates; few intersecting slickensides; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

ACca—26 to 32 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) clay, dark grayish brown (2.5Y 4/2) and yellowish brown (10YR 5/4) moist; moderate coarse prismatic structure; very hard, firm, sticky and very plastic; common very fine roots; few very fine tubular pores; few weak wedge-shaped structural aggregates; very few intersecting slickensides; strongly effervescent; lime is disseminated and is segregated as few fine soft masses, filaments, and concretions; moderately alkaline; clear wavy boundary.

Cca—32 to 47 inches; yellowish brown (10YR 5/4) and grayish brown (2.5Y 5/2) clay, yellowish brown (10YR 5/4) and dark grayish brown (2.5Y 4/2) moist; strong coarse prismatic structure; very hard, firm, sticky and plastic; few very fine and fine tubular pores; strongly effervescent; lime is disseminated and is segregated as few fine soft masses, filaments, and concretions; moderately alkaline; abrupt irregular boundary.

Cr—47 to 60 inches; olive (5Y 5/3) and pale brown (10YR 6/3), strongly weathered, calcareous shale and sandstone.

Depth to a paralithic contact is 40 to 60 inches. Cracks 1.0 to 2.5 centimeters wide extend to a depth of 20 to 45 inches when the soil is dry. The cracks are 3 to 10 centimeters wide at the surface. Very few to many slickensides are present in the lower part of the A horizon and the upper part of the C horizon. The upper part of the A horizon is 40 to 50 percent clay. The lower part of the A and the C horizon are clay, silty clay, or clay loam and are 35 to 50 percent clay.

The A horizon has color of 2.5Y 4/2 or 5/2 or of 10YR 3/3, 4/2, 4/3, 5/2, 5/3, 5/4, or 6/4. Moist color is 2.5Y 3/2 or 4/2 or 10YR 2/2, 3/3, or 5/4. Values of higher than 5.5 when dry and 3.5 when moist are present only in a few pedons.

The C horizon has color of 2.5Y 5/2 or 5/4; 10YR 4/3, 5/3, or 5/4; or 7.5YR 6/4. Moist color is 2.5Y 4/2 or 4/4; 10YR 4/3, 4/4, or 5/4; or 7.5YR 5/4.

Ballvar Series

The Ballvar series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 2 to 8 percent.

Soils of the Ballvar series are fine-loamy, mixed, thermic Typic Haploxerolls.

Typical pedon of Ballvar loam, 2 to 8 percent slopes, about 11 miles west-southwest from the city of Los Banos; 2,700 feet west and 2,200 feet south of the northwest corner of sec. 6, T. 11 S., R. 9 E., San Luis Dam Quadrangle.

A11—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; strong medium and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; neutral; clear smooth boundary.

A12—4 to 15 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 1.4 percent organic matter; mildly alkaline; gradual smooth boundary.

B1t—15 to 23 inches; dark yellowish brown (10YR 4/4) loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and few fine tubular pores; common thin colloidal stains on peds and in pores; mildly alkaline; clear smooth boundary.

B21t—23 to 35 inches; dark yellowish brown (10YR 4/4, dry or moist) sandy clay loam; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; common thin clay films and colloidal stains on peds and in pores; moderately alkaline; clear wavy boundary.

B22t—35 to 45 inches; yellowish brown (10YR 5/6) sandy clay loam, dark yellowish brown (10YR 4/6) moist; weak very coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; few thin clay films on peds and in pores; moderately alkaline; clear wavy boundary.

C—45 to 62 inches; yellowish brown (10YR 5/6, dry or

moist) loam; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline.

The A horizon is 5 to 19 inches thick. It has color of 7.5YR 4/4 or 4/6 or of 10YR 3/4, 4/3, 4/6, or 5/3. Moist color is 10YR 3/2 or 3/3. The A horizon is 18 to 25 percent clay and is 1 to 2 percent organic matter.

The B horizon is loam or sandy clay loam and is 20 to 30 percent clay. It has color of 7.5Y 4/4 or 4/6, 10YR 4/4 or 5/6, or 2.5Y 4/4 or 5/4. Moist color is 10YR 3/4, 4/3, 4/4, or 4/6.

The C horizon is loam or sandy clay loam and is 20 to 27 percent clay. It has color of 7.5YR 4/6 or 5/6 or of 10YR 4/6, 5/4, or 5/6. Moist color is 7.5YR 4/4 or 10YR 3/4, 4/4, or 5/6. The C horizon is mildly alkaline or moderately alkaline.

Bapos Series

The Bapos series consists of very deep, well drained soils on terraces. These soils formed in alluvium derived from various kinds of rock. Slope is 0 to 15 percent.

Soils of the Bapos series are fine, mixed, thermic Mollic Palexeralfs.

Typical pedon of Bapos clay loam, 2 to 8 percent slopes, about 10 miles southwest of the city of Los Banos; 900 feet north and 100 feet east of the southwest corner of sec. 21, T. 12 S., R. 10 E., Ortigalita Peak Northwest Quadrangle.

A11—0 to 4 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/3) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; 3 percent gravel 5 to 40 millimeters in diameter; neutral; clear irregular boundary.

A12—4 to 12 inches; yellowish red (5YR 4/6) clay loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; 3 percent gravel 5 to 50 millimeters in diameter; slightly effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; abrupt wavy boundary.

B21t—12 to 26 inches; reddish brown (5YR 4/4) clay, reddish brown (5YR 4/4) and yellowish red (5YR 5/6) moist; strong coarse angular blocky structure; slightly hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; 2 percent gravel 2 to 20 millimeters in diameter; common moderately thick clay films on peds and in pores; slightly effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; clear smooth boundary.

B22tca—26 to 38 inches; reddish brown (5YR 4/4) clay, yellowish red (5YR 4/6) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; 3 percent gravel 5 to 50 millimeters in diameter; common moderately thick clay films on peds and in pores; strongly effervescent; lime is disseminated and is segregated as few fine and medium soft masses; moderately alkaline; clear smooth boundary.

B3tca—38 to 45 inches; strong brown (7.5YR 5/6) clay, yellowish red (5YR 4/6) moist; weak coarse angular blocky structure; hard, firm, sticky and plastic; no roots; few fine tubular pores; 7 percent gravel 2 to 50 millimeters in diameter; common moderately thick clay films on peds and in pores; strongly effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; abrupt wavy boundary.

IIC—45 to 60 inches; yellowish red (5YR 4/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; few fine prominent black (5YR 2/1) mottles when moist; massive; slightly hard, firm, sticky and plastic; no roots; few very fine tubular pores; 50 percent gravel 2 to 50 millimeters in diameter; common thin pressure faces; slightly effervescent; disseminated lime; moderately alkaline.

The A horizon has color of 7.5YR 3/3, 3/4, 4/4, 5/4, or 6/4 or of 5YR 3/4, 4/4, or 4/6. Moist color is 7.5YR 3/3 or 3/4 or 5YR 3/3 or 3/4. The upper part of the A horizon has value of 3 when moist. It is 1 to 2 percent organic matter. The A horizon is sandy clay loam or clay loam. It is as much as 15 percent gravel and is 20 to 35 percent clay. It is neutral to moderately alkaline and is as much as 5 percent calcium carbonate. Some pedons have a thin A2 horizon.

The B2t horizon has color of 7.5YR 3/4, 4/4, 4/6, or 5/4 or of 5YR 4/4 or 4/6. Moist color is 7.5YR 3/4, 4/4, 4/6, or 5/4 or 5YR 4/4, 4/6, or 5/6. The horizon is clay or clay loam. It is 35 to 55 percent clay. It has an abrupt upper boundary with a clay increase of at least 15 percent. It is as much as 15 percent gravel. It is mildly alkaline or moderately alkaline and is 5 to 15 percent calcium carbonate.

The B3t horizon has color of 7.5YR 4/4, 4/6, 5/4, 5/6, or 6/6. Moist color is 7.5YR 4/4, 4/6, or 5/4 or 5YR 4/6. The horizon is clay or clay loam. It is 35 to 50 percent clay and 0 to 15 percent gravel.

The IIC horizon has color of 5Y 5/8; 7.5YR 4/6, 5/6, 6/6, 8/2, or 8/4; 5YR 4/6, 5/6, or 5/8; or 2.5YR 5/4. Moist color is 7.5YR 4/6 or 5YR 5/6, 5/8, or 6/8. The horizon is clay loam or sandy clay loam and is 15 to 55 percent gravel. It is mildly alkaline or moderately alkaline.

Bisgani Series

The Bisgani series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Bisgani series are sandy, mixed, thermic Typic Haplaquolls.

Typical pedon of Bisgani loamy sand, partially drained, 10 miles north of the city of Dos Palos; about 4,500 feet north and 50 feet west of the southeast corner of sec. 29, T. 9 S., R. 12 E., Delta Ranch Quadrangle.

Ap—0 to 14 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

A12g—14 to 20 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (2.5Y 3/2) moist; few fine distinct yellowish brown (10YR 5/8) mottles when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; mildly alkaline; abrupt smooth boundary.

C1g—20 to 43 inches; light gray (2.5Y 7/2) coarse sand, light olive brown (2.5Y 5/4) moist; few fine distinct olive yellow (2.5Y 6/6) mottles, many fine distinct yellowish brown (10YR 5/8) when moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

C2g—43 to 60 inches; light gray (N 7/0) coarse sand, light brownish gray (2.5Y 6/2) moist; common fine distinct olive yellow (2.5Y 6/6) mottles when moist; single grain; loose, nonsticky and nonplastic; no roots; many very fine interstitial pores; slightly effervescent; disseminated lime; moderately alkaline

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. The thickness of the mollic epipedon ranges from 10 to 22 inches because of land leveling. The 10- to 40-inch control section averages less than 5 percent clay, but it ranges from 2 to 10 percent clay. Organic matter content is 1 to 3 percent in the upper 10 to 22 inches; it decreases regularly with increasing depth to less than 1 percent at a depth of 22 inches. The profile is mildly alkaline or moderately alkaline.

The A horizon has color of 10YR 4/1, 4/2, 5/1, or 5/2 or of 2.5Y 4/2 or 5/2. Moist color is 10YR 2/1, 3/1, 3/2, or 3/3 or 2.5Y 3/2. The horizon is slightly effervescent in some pedons. In some pedons a thin layer of clay loam is on the surface.

The C horizon has color of 10YR 6/2, 6/3, 7/1, 7/2, or 7/3; 2.5Y 5/2, 6/2, 7/1, or 7/2; or N 7/0. Moist color is 10YR 4/2, 4/3, or 5/4 or 2.5Y 4/2, 5/2, 5/4, or 6/2. The horizon is sandy loam, loamy sand, or coarse sand and is 2 to 5 percent fine gravel in some pedons.

Bolfar Series

The Bolfar series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Bolfar series are fine-loamy, mixed (calcareous), thermic Cumulic Haplaquolls.

Typical pedon of Bolfar clay loam, partially drained, 7 miles north of the city of Dos Palos; 1,100 feet east and 300 feet south of the northwest corner of sec. 11, T. 10 S., R. 12 E., Delta Ranch Quadrangle.

Ap—0 to 11 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) and very dark gray (10YR 3/1) moist; strong medium granular structure; hard, friable, sticky and plastic; few fine and medium roots; few very fine and fine tubular and interstitial pores; strongly effervescent; lime is disseminated and is segregated as fine irregular concretions; moderately alkaline; abrupt smooth boundary.

A12—11 to 25 inches; dark gray (10YR 4/1) and grayish brown (10YR 5/2) clay loam, black (10YR 2/1) moist; common medium faint dark grayish brown (10YR 4/2) mottles when moist; moderate medium prismatic structure; hard, friable, sticky and plastic; few fine and medium roots; common very fine and fine tubular pores; common moderately thick clay films on peds and staining mineral grains; strongly effervescent; lime is disseminated and is segregated as fine irregular concretions; moderately

alkaline; clear smooth boundary.

B2t—25 to 29 inches; light gray (10YR 6/1) clay loam, dark gray (10YR 4/1) moist; common fine distinct white (10YR 8/1) mottles, light brownish gray (10YR 6/2) moist; moderate fine and medium prismatic structure; hard, friable, sticky and plastic; few medium roots; common very fine tubular pores; common moderately thick clay films on peds and in pores; slightly effervescent; lime is disseminated and is segregated as few fine irregular concretions; moderately alkaline; clear wavy boundary.

B3t—29 to 41 inches; olive gray (5Y 4/2) and olive (5Y 5/3) loam, olive gray (5Y 4/2) and very dark grayish brown (2.5Y 3/2) moist; few fine distinct olive yellow (5Y 6/8) mottles, few medium prominent strong brown (7.5YR 5/8) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; few medium roots; common very fine and fine tubular pores; common thin clay films on peds; slightly effervescent; lime is disseminated and is segregated as few fine irregular concretions; moderately alkaline; clear wavy boundary.

C1—41 to 53 inches; olive (5Y 5/3) and olive gray (5Y 4/2) loam, olive gray (5Y 4/2) and dark olive gray (5Y 3/2) moist; common fine prominent yellowish brown (10YR 5/6) mottles, common fine and medium prominent yellowish brown (10YR 5/8) moist; weak medium angular blocky structure; hard, friable, sticky and plastic; common very fine and fine tubular and interstitial pores; few thin clay films on peds; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C2—53 to 60 inches; gray (5Y 6/1) loam, greenish gray (5GY 6/1) moist; common large prominent yellowish brown (10YR 5/6) mottles, yellowish brown (10YR 5/8) moist; massive; slightly hard, friable, sticky and plastic; common very fine and fine tubular and interstitial pores; moderately alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. The thickness of the mollic epipedon ranges from 24 to 30 inches because of land leveling. The 10- to 40-inch control section averages 27 to 35 percent clay, but individual layers are 18 to 35 percent clay. Organic matter content is 1 to 3 percent in the upper 24 to 30 inches; it decreases regularly with increasing depth to less than 0.5 percent at a depth of 50 inches. Some pedons are noncalcareous below a depth of 20 inches.

The A horizon has color of 10YR 3/1, 4/1, or 5/2 or of 2.5Y 3/2 or 5/2. Moist color is 10YR 2/1, 3/1, or 3/2; 2.5Y 3/2; or N 2/0. The horizon is mildly alkaline or moderately alkaline.

The B2t horizon has color of 10YR 5/2 or 6/1; 2.5Y 6/2; or 5Y 5/4, 6/1, or 6/2. Moist color is 10YR 3/3, 4/1, 4/2, 4/4, or 5/3; 5Y 3/2, 4/1, 4/2, 4/3, or 5/2; or 2.5Y 3/2, 4/2, or 5/2. Mottles are distinct or prominent. The horizon is loam, sandy clay loam, or clay loam. Typically, the electrical conductivity is less than 2 millimhos per centimeter and the exchangeable sodium percentage is less than 7.

The C horizon has color of 7.5YR 5/8; 5Y 4/2, 4/3, 5/3, or 6/1; or 2.5Y 4/2 or 6/2. Moist color is 10YR 4/2 or 4/4; 5Y 3/1, 3/2, 4/1, 4/2, 4/3, 5/2, 5/3, or 5/6; 2.5Y 3/2, 4/2, 4/4, or 5/4; 5GY 5/1 or 6/1; 5BG 5/1; or 5G 5/1. It is loam or clay loam. Some pedons are stratified with sandy loam, loam, or sandy clay loam.

Britto Series

The Britto series consists of very deep, very poorly drained soils on the valley basin rim. These soils have a high concentration of salts and sodium in the lower part. They formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Britto series are fine, montmorillonitic, thermic Typic Natraqualfs.

Typical pedon of Britto clay loam, about 6 miles southeast of the city of Los Banos; 2,400 feet south and 150 feet east of the northwest corner of sec. 8, T. 11 S., R. 11 E., Charleston School Quadrangle.

A1—0 to 1 inch; light gray (10YR 6/1) clay loam, very dark grayish brown (10YR 3/2) moist; strong fine platy structure; very hard, friable, sticky and plastic; many very fine roots; mildly alkaline; abrupt smooth boundary.

A2—1 to 5 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent reddish yellow (7.5YR 6/8) mottles, strong brown (7.5YR 4/6) moist; weak coarse angular blocky structure; very hard, firm, sticky and plastic; common very fine roots and few fine and medium roots; 30 percent clay; neutral; abrupt smooth boundary.

B21t—5 to 16 inches; olive gray (5Y 5/2) clay, dark gray (5Y 4/1) moist; many fine and medium prominent olive brown (2.5Y 4/4) mottles, common fine prominent greenish gray (5GY 5/1) and dark greenish gray (5GY 4/1) moist; strong very coarse, coarse, and medium columnar structure; very hard, very firm, very sticky and very plastic; common very fine and few fine roots; few very fine tubular pores;

many moderately thick pressure faces; 51 percent clay; electrical conductivity is 2.1 millimhos per centimeter; exchangeable sodium percentage is 20; strongly alkaline; clear wavy boundary.

B22t—16 to 22 inches; light yellowish brown (10YR 6/4) clay, brown (10YR 4/3) moist; moderate coarse angular blocky structure; very hard, friable, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many thin clay films on peds and in pores; 48 percent clay; electrical conductivity is 5 millimhos per centimeter; exchangeable sodium percentage is 24; slightly effervescent; disseminated lime; strongly alkaline; clear wavy boundary.

C1—22 to 37 inches; light yellowish brown (2.5Y 6/4) clay, dark yellowish brown (10YR 4/4) moist; dark yellowish brown (10YR 4/6) root stains on peds; moderate medium angular blocky structure; hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many moderately thick pressure faces; slightly effervescent; disseminated lime; strongly alkaline; clear wavy boundary.

C2—37 to 62 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/6) moist; few fine distinct yellow (10YR 7/8) and gray (5Y 6/1) mottles when moist; weak medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine roots; few very fine tubular pores; electrical conductivity is 20 millimhos per centimeter; exchangeable sodium percentage is 25; strongly effervescent; disseminated lime; 10 percent gypsum masses 2 millimeters in diameter; strongly alkaline.

The water table is at a depth of 12 to 36 inches from October through March. In many areas the entire profile is saturated from September through May by a water table and stagnant surface water. The A1 horizon is 27 to 35 percent clay. The A2 horizon is 27 to 30 percent clay. The B2t horizon is 35 to 55 percent clay and has at least 8 percent more clay (absolute) than does the A horizon. The electrical conductivity of the entire profile is 2 to 20 millimhos per centimeter. The exchangeable sodium percentage of the B horizon is 16 to 30.

The A1 horizon has color of 10YR 5/2, 5/3, 6/1, 6/2, or 6/3 or of 5Y 5/1. Moist color is 10YR 3/1, 3/2, 3/3, or 4/2 or 5Y 4/1. Some pedons have few fine prominent brownish yellow (10YR 6/6) mottles when moist. The horizon is mildly alkaline or moderately alkaline.

The A2 horizon has color of 10YR 6/3, 2.5Y 6/2 or 6/4, or 5Y 8/1. Moist color is 10YR 4/1 or 4/3, 5Y 6/2, or 2.5Y 4/2. Mottles have color of 7.5YR 6/8 or 10YR 3/1 when dry and of 7.5YR 4/6 or 10YR 5/3 when moist. The horizon is neutral or mildly alkaline.

The B2t horizon has color of 10YR 3/3, 4/4, 5/2, or 6/4; 2.5Y 4/2 or 5/4; or 5Y 5/2. Moist color is 10YR 4/2 or 4/3; 5Y 4/1; or 2.5Y 4/1, 4/2, or 5/3. Mottles when dry are many, fine or medium, and distinct and have color of 2.5Y 4/4 or 5Y 4/4 or are common, fine, and prominent and have color of 10YR 3/3 or 5/3 or of 5GY 5/1. Mottles when moist are few, fine, and prominent and have color of 10YR 3/1 or N 2/0 or are common, fine or medium, and prominent and have color of 5Y 4/2 or of 5GY 5/1 or 4/1. The B2t horizon is clay loam or clay. It is noneffervescent to strongly effervescent and is moderately alkaline or strongly alkaline.

The C horizon has color of 10YR 5/2, 5/3, or 6/6 or of 2.5Y 4/4, 5/2, or 6/4. Moist color is 10YR 4/3, 4/4, 5/4, or 5/6 or 5Y 3/1, 4/3, or 5/3. Mottles when moist are few, fine, and prominent and have color of N 2/0; are few, fine, and distinct and have color of 10YR 7/8 or 5Y 6/1; or are common, fine, and prominent and have color of 7.5YR 4/4, 10YR 2/2, or 5Y 6/1. The C horizon is sandy clay loam, clay loam, or clay and is 30 to 50 percent clay. It is slightly effervescent or strongly effervescent and has few, fine to common, and medium soft lime masses. Some pedons do not have gypsum masses. The C horizon is moderately alkaline or strongly alkaline.

Capay Series

The Capay series consists of very deep, moderately well drained soils on low alluvial fans. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Capay series are fine, montmorillonitic, thermic Typic Chromoxererts.

Typical pedon of Capay clay, 3 miles south of the city of Los Banos; about 100 feet east and 50 feet south of the northwest corner of sec. 2, T. 11 S., R. 10 E., Los Banos Quadrangle.

Ap—0 to 12 inches; brown (10YR 5/3) clay, very dark grayish brown (2.5Y 3/2) moist; strong medium and coarse subangular blocky structure; very hard, friable, sticky and very plastic; few fine roots; few very fine tubular pores; moderately alkaline; clear smooth boundary.

A12—12 to 22 inches; brown (10YR 5/3) clay, very dark grayish brown (2.5Y 3/2) moist; strong medium and coarse prismatic structure; very hard, friable, sticky and plastic; few fine roots; few very fine tubular

pores; moderately alkaline; abrupt smooth boundary.

IIC1—22 to 27 inches; yellowish brown (10YR 5/4) clay, brown (10YR 4/3) moist; moderate medium subangular blocky structure; very hard, friable, very sticky and very plastic; few very fine roots; few very fine tubular pores; common fine discontinuous gypsum seams; slightly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

IIIC2—27 to 39 inches; yellowish brown (10YR 5/4) clay, dark brown (10YR 3/3) moist; strong fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; 70 percent very strongly weathered shale fragments; moderately alkaline; clear wavy boundary.

IIIC3—39 to 54 inches; light yellowish brown (10YR 6/4) clay, olive brown (2.5Y 4/4) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; 50 percent strongly weathered shale fragments; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

IVC4—54 to 63 inches; light yellowish brown (10YR 6/4) clay, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and very plastic; no roots; common very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline.

Cracks 1 to 2 centimeters wide extend to a depth of 20 inches or more when the soil is dry. The cracks are 2 to 7 centimeters wide at the surface.

The A horizon is 12 to 22 inches thick. It has color of 10YR 5/1, 5/2, or 5/3. Moist color is 10YR 3/2 or 3/3 or 2.5Y 3/2 or 3/3. The A horizon is clay loam or clay and is 35 to 60 percent clay. Reaction is neutral to moderately alkaline.

The C horizon has color of 10YR 4/2, 5/4, or 6/4. Moist color is 10YR 3/3, 3/4, or 4/3 or 2.5Y 4/4. The lower part of the C horizon is clay loam in some pedons. The C horizon is 35 to 60 percent clay.

The Capay soils in this survey area have very slow permeability and a shaly C horizon. These differences are outside the range for the series; however, they do not significantly affect the use and management of the soils.

Carranza Series

The Carranza series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 8 percent.

Soils of the Carranza series are fine-loamy, mixed, thermic Pachic Haploxerolls.

Typical pedon of Carranza gravelly clay loam, 2 to 8 percent slopes, about 4 miles west-northwest of the community of Santa Nella; 350 feet south and 50 feet east of the northwest corner of sec. 34, T. 9 S., R. 8 E., San Luis Dam Quadrangle.

A1—0 to 12 inches; brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine roots; common very fine and few fine tubular pores; very few thin pressure faces; 23 percent clay; 20 percent gravel 2 to 40 millimeters in diameter; neutral; clear smooth boundary.

B2t—12 to 22 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine roots; common very fine and few fine tubular pores; few thin clay films on peds and in pores; 29 percent clay; 10 percent gravel 2 to 40 millimeters in diameter; neutral; clear wavy boundary.

C1—22 to 30 inches; brown (7.5YR 4/2) gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and plastic; few very fine roots; common very fine tubular pores; few thin clay films bridging sand grains; 30 percent gravel and cobbles; neutral; clear wavy boundary.

C2—30 to 38 inches; strong brown (7.5YR 4/6) gravelly sandy clay loam, dark brown (7.5YR 4/4) moist; massive; hard, friable, slightly sticky and plastic; few fine roots; common very fine tubular pores; few thin clay films bridging sand grains; 25 percent gravel and cobbles; neutral; gradual smooth boundary.

IIC3—38 to 60 inches; yellowish brown (10YR 5/4) extremely gravelly sandy clay loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; no roots; no pores; 75 percent gravel and cobbles; neutral.

The pachic epipedon includes the A1 and B2t horizons. Depth to the IIC3 horizon is 35 to 57 inches. The solum is neutral, and the C horizon is neutral or mildly alkaline.

The A horizon has color of 10YR 4/2 or 5/3 or of 7.5YR 4/2. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2.

The horizon is gravelly loam or gravelly clay loam. It is 20 to 35 percent clay and 15 to 25 percent gravel.

The B horizon has color of 10YR 4/2, 4/4, 5/2, or 5/4 or of 7.5YR 4/2, 4/4, 5/2, or 5/4. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The horizon is clay loam, gravelly loam, or gravelly clay loam. It is 25 to 35 percent clay and 5 to 25 percent gravel.

The C horizon has color of 10YR 5/3 or 5/4 or of 7.5YR 4/2, 4/4, 4/6, 5/4, or 5/6. Moist color is 10YR 4/3 or 4/4 or 7.5YR 3/4, 4/4, or 4/6. The horizon is gravelly sandy clay loam or gravelly loam. It is 25 to 35 percent clay and 15 to 35 percent gravel.

The IIC horizon is dense extremely gravelly sandy clay loam, extremely gravelly sandy loam, or extremely gravelly loam. It is 10 to 30 percent clay and 60 to 90 percent gravel.

Chaqua Series

The Chaqua series consists of deep, well drained soils on terraces. These soils formed in mixed alluvium derived from calcareous sedimentary and igneous rock. Slope is 2 to 8 percent.

Soils of the Chaqua series are fine-loamy, mixed, thermic Calcixerollic Xerochrepts.

Typical pedon of Chaqua loam, 2 to 8 percent slopes, about 9 miles southwest of the city of Los Banos; 1 200 feet south and 700 feet west of the northeast corner of sec. 26, T. 11 S., R. 9 E., Ortigalita Peak Northwest Quadrangle.

A11—0 to 6 inches; light yellowish brown (10YR 6/4) loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine roots; few very fine and fine tubular pores; 2 percent gravel 2 to 15 millimeters in diameter; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

A12ca—6 to 19 inches; yellowish brown (10YR 5/4) loam, strong brown (7.5YR 4/6) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, sticky and plastic; many very fine roots; common very fine and fine tubular pores; 23 percent clay; common thin clay films in pores; 2 percent gravel 2 to 15 millimeters in diameter; strongly effervescent; lime is disseminated and is segregated as few fine filaments; moderately alkaline; gradual smooth boundary.

B1tca—19 to 25 inches; brown (7.5YR 5/4) loam, strong brown (7.5YR 4/6) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine roots; common very fine and fine tubular pores; many thin clay films on peds and in pores; 2 percent gravel 2 to 15 millimeters in diameter; violently effervescent; lime is disseminated and is segregated as few fine filaments; moderately alkaline; clear smooth boundary.

B2tca—25 to 35 inches; brown (7.5YR 5/4) loam, strong brown (7.5YR 4/6) moist; weak fine and medium subangular blocky structure; soft, very friable, sticky and plastic; common very fine roots; common very fine and fine tubular pores; 26 percent clay; many thin clay films on peds and in pores; 2 percent gravel 2 to 15 millimeters in diameter; violently effervescent; lime is disseminated and is segregated as few fine filaments; moderately alkaline; clear smooth boundary.

Cca—35 to 47 inches; strong brown (7.5YR 5/6) loam, strong brown (7.5YR 4/6) moist; weak fine and medium subangular blocky structure; soft, friable, sticky and plastic; common very fine roots; common very fine and fine tubular pores; common thin clay films on peds and many thin clay films in pores; 10 percent gravel 2 to 15 millimeters in diameter; strongly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

IICr—47 to 50 inches; strongly weathered, calcareous sandstone.

Depth of the solum is 26 to 44 inches. Depth to a paralithic contact is 40 to 60 inches. The solum generally is less than 5 percent gravel throughout; however, in some pedons it is as much as 15 percent. The C horizon is 5 to 15 percent gravel. Secondary lime occurs as few to common, fine or medium, soft masses or filaments and is at a depth of 5 to 20 inches. The profile is mildly alkaline or moderately alkaline throughout.

The A horizon has color of 10YR 4/4, 5/4, or 6/4 or of 7.5YR 5/4. Moist color is 10YR 3/4 or 4/3 or 7.5YR 3/4 or 4/6. It is 22 to 27 percent clay.

The B horizon has color of 7.5YR 4/4, 5/4, or 5/6. Moist color is 7.5YR 3/4 or 4/6. The horizon is loam, clay loam, or sandy clay loam and is 23 to 30 percent clay.

The C horizon has color of 7.5YR 5/4, 5/6, 6/4, or 6/6. Moist color is 7.5YR 4/4, 4/6, 5/4, or 5/6. The horizon is loam, clay loam, or sandy clay loam and is 18 to 30 percent clay.

Chateau Series

The Chateau series consists of very deep, poorly drained soils on low alluvial fans adjacent to the valley basin rim. These soils have a high concentration of sodium. They formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Chateau series are fine, mixed, thermic Aquic Xerochrepts.

Typical pedon of Chateau clay, partially drained, about 5.5 miles southwest of the city of Dos Palos; 1,000 feet north and 400 feet west of the southeast corner of sec. 31, T. 11 S., R. 12 E., Dos Palos Quadrangle.

Ap1—0 to 6 inches; brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) moist; few fine distinct yellowish brown (10YR 5/6) mottles when moist; weak medium and coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular and interstitial pores; exchangeable sodium percentage is 27; electrical conductivity is 14 millimhos per centimeter; strongly alkaline; clear smooth boundary.

Ap2—6 to 15 inches; brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) moist; few fine distinct yellowish brown (10YR 5/4) mottles when moist; strong medium angular blocky structure; hard, very firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds; exchangeable sodium percentage is 28; electrical conductivity is 12 millimhos per centimeter; strongly alkaline; abrupt wavy boundary.

B2—15 to 23 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; many medium faint dark yellowish brown (10YR 3/4) mottles when moist; strong medium angular blocky structure; hard, firm, sticky and very plastic; no roots; few very fine tubular pores; many thin clay films on peds; exchangeable sodium percentage is 26; electrical conductivity is 11 millimhos per centimeter; few fine gypsum crystals; strongly alkaline; gradual smooth boundary.

C1—23 to 44 inches; yellowish brown (10YR 5/4) silty clay, dark yellowish brown (10YR 4/4) moist; common fine prominent very dark grayish brown (2.5Y 3/2) mottles when moist; weak medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine tubular pores; common thin clay films on peds and in pores; exchangeable sodium percentage is 23; strongly alkaline; gradual smooth boundary.

C2—44 to 62 inches; yellowish brown (10YR 5/4) silty clay, dark yellowish brown (10YR 4/4) moist; many medium faint dark yellowish brown (10YR 3/4) mottles when moist; massive; slightly hard, friable, sticky and very plastic; common very fine tubular pores; many colloidal stains; slightly effervescent; disseminated lime; exchangeable sodium percentage is 29; strongly alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. Thickness of the A horizon ranges from 6 to 23 inches because of land leveling. The textural control section averages from 35 to 60 percent clay. Organic matter content is less than 1 percent in the upper 15 inches, and it decreases regularly with increasing depth.

The A horizon has color of 10YR 4/3, 5/2, 5/3, or 5/4. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, or 5/3. The horizon is mildly alkaline to strongly alkaline. Exchangeable sodium percentage is 15 to 30.

The B horizon has color of 10YR 5/3, 5/4, or 6/4. Moist color is 10YR 3/3, 3/4, 4/3, or 4/4 or 2.5Y 4/4. The horizon is clay loam, silty clay, or clay. Exchangeable sodium percentage is 15 to 29.

The C horizon has color of 10YR 5/4, 6/3, or 6/4. Moist color is 10YR 3/3, 4/2, 4/3, 4/4, or 5/4 or 2.5Y 4/4. The horizon is silty clay or clay. Exchangeable sodium percentage is 23 to 40. The lower part of the C horizon is noncalcareous in some pedons. Small fragments of strongly weathered clayey shale are present in some pedons.

Checker Series

The Checker series consists of very deep, somewhat poorly drained soils in the valley basin. These soils have a very high concentration of salts and sodium. They formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Checker series are fine-loamy, mixed, thermic Calcixerollic Xerochrepts.

Typical pedon of Checker loam, about 5.5 miles southeast of the city of Los Banos; 2,800 feet east and 550 feet north of the southwest corner of sec. 27, T. 10 S., R. 11 E., Los Banos Quadrangle.

A11—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few

very fine and fine roots; few very fine and fine tubular pores electrical conductivity is 92 millimhos per centimeter; exchangeable sodium percentage is 56; moderately alkaline; clear smooth boundary.

A12—4 to 9 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; strong medium subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine, fine, and medium roots; common very fine tubular pores; strongly effervescent; disseminated lime; 18 percent calcium carbonate equivalent; electrical conductivity is 30 millimhos per centimeter; exchangeable sodium percentage is 40; moderately alkaline; clear smooth boundary.

ACca—9 to 15 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, slightly sticky and plastic; few very fine, fine, and medium roots; common very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; 18 percent calcium carbonate equivalent; electrical conductivity is 22 millimhos per centimeter; exchangeable sodium percentage is 32; moderately alkaline; clear wavy boundary.

C1ca—15 to 36 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, sticky and plastic; few fine and medium roots; common very fine and few fine tubular pores; strongly effervescent; disseminated lime; 12 percent calcium carbonate equivalent; electrical conductivity is 32 millimhos per centimeter; exchangeable sodium percentage is 40; moderately alkaline; clear wavy boundary

C2—36 to 55 inches; light gray (5Y 7/2) clay loam, olive (5Y 5/3) moist, massive; hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular pores, strongly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; 10 percent calcium carbonate equivalent electrical conductivity is 22 millimhos per centimeter; exchangeable sodium percentage is 31; moderately alkaline; clear wavy boundary.

IIC3ca—55 to 59 inches; light gray (5Y 7/2) clay loam, olive (5Y 5/3) moist; few fine prominent reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, sticky and very plastic; no roots; common fine and few medium tubular pores; violently effervescent; lime is disseminated and is segregated as many medium irregular soft masses and concretions; 34 percent calcium carbonate equivalent; electrical conductivity is 14 millimhos per centimeter; exchangeable sodium percentage is 20; strongly alkaline; abrupt wavy boundary.

IIC4—59 to 61 inches; pale yellow (5Y 8/3) silty clay, pale olive (5Y 6/3) moist; few fine prominent reddish yellow (7.5YR 6/6) mottles, strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, very sticky and very plastic; few very fine tubular pores; slightly effervescent; disseminated lime; 10 percent calcium carbonate equivalent; electrical conductivity is 14 millimhos per centimeter; exchangeable sodium percentage is 28; strongly alkaline.

The water table fluctuates between depths of 36 and 48 inches in October through March. The calcium carbonate equivalent is 5 to 40 percent. The electrical conductivity is 10 to 100 millimhos per centimeter, and the exchangeable sodium percentage is 15 to 60.

The A horizon has color of 10YR 4/2, 5/1, 5/2, 5/3, 6/2, or 6/3 or of 2.5Y 5/2, 6/2, 6/6, or 7/4. Moist color is 10YR 3/1, 3/2, 3/3, 4/2, 4/3, or 5/3 or 2.5Y 3/2, 4/2, 4/4, or 6/4. The A horizon is 18 to 27 percent clay. It is noneffervescent to violently effervescent but is effervescent in the lower part in all pedons.

The C horizon has color of 10YR 6/3, 6/4, 7/3, or 7/6; 2.5Y 5/4, 6/6, 7/2, 7/4, or 7/6; or 5Y 6/3, 6/4, 7/2, 7/3, 8/2, or 8/3. Moist color is 10YR 4/3, 5/3, 5/6, or 6/2; 2.5Y 4/2, 4/4, 5/2, 5/4, 6/2, or 6/4; or 5Y 4/2, 4/3, 5/3, 6/2, or 6/3. In the lower part of the horizon, mottles when moist are few, fine, and prominent and have color of 7.5YR 4/6, 5/6, or 6/6; 10YR 5/6 or 8/1; 2.5Y 5/6 or 6/6; 5GY 5/1, 6/1, or 7/1; or 5G 4/1, 4/4, or 5/1. The upper part of the horizon is loam or clay loam and is 20 to 30 percent clay. The lower part dominantly is clay loam or silty clay and is 35 to 45 percent clay. In some pedons the lower part of the horizon is loamy sand or clay. The horizon is slightly effervescent to violently effervescent and is moderately alkaline or strongly alkaline.

Chinvar Series

The Chinvar series consists of very deep, somewhat poorly drained soils on alluvial fans and creek overflows. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Chinvar series are fine-loamy, mixed, thermic Aquic Haploxerolls.

Typical pedon of Chinvar loam, about 12 miles northwest of the city of Los Banos; 1,800 feet north and 1,100 feet east of the southwest corner of sec. 23, T. 9

S., R. 9 E., Ingomar Quadrangle.

Ap1—0 to 3 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3 and 4/3) moist; strong medium granular structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; common very fine and few fine tubular pores; 2.3 percent organic matter; moderately alkaline; clear smooth boundary.

Ap2—3 to 8 inches; brown (10YR 5/3) and light yellowish brown (10YR 6/4) loam, dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine and few fine tubular pores; 2 percent organic matter; electrical conductivity is 2 millimhos per centimeter; exchangeable sodium percentage is 9; moderately alkaline; abrupt wavy boundary.

A13—8 to 13 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; 2.5 percent organic matter; moderately alkaline; abrupt irregular boundary.

C1—13 to 20 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate thin platy structure and weak medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 0.3 percent organic matter; slightly effervescent; disseminated lime; electrical conductivity is 4 millimhos per centimeter; exchangeable sodium percentage is 11; moderately alkaline; abrupt irregular boundary.

C2ca—20 to 26 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 3/4) moist; few fine distinct brownish yellow (10YR 6/8) mottles, few fine prominent grayish brown (2.5Y 5/2) and light gray (2.5Y 7/2) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as few fine irregular filaments; electrical conductivity is 4 millimhos per centimeter; exchangeable sodium percentage is 12; moderately alkaline; clear smooth boundary.

C3—26 to 38 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; few fine prominent brown (7.5YR 5/4) mottles, dark brown (7.5YR 3/4) moist; massive; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as few fine irregular filaments; electrical conductivity is 4 millimhos per centimeter; exchangeable sodium percentage is 10; moderately alkaline; clear smooth boundary.

IIC4—38 to 49 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; no roots; many fine interstitial pores; 20 percent gravel 2 to 20 millimeters in diameter; moderately alkaline; clear smooth boundary.

IIC5—49 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, loose, nonsticky and nonplastic; many very fine pores; 50 percent gravel 2 to 20 millimeters in diameter; electrical conductivity is 2 millimhos per centimeter; exchangeable sodium percentage is 7; mildly alkaline.

The water table fluctuates between depths of 36 and 60 inches in December through March. Exchangeable sodium percentage of the profile is 5 to 14; it generally is higher in the lower part of the profile.

The A horizon dominantly has color of 10YR 4/2, 5/2, 5/3, 5/4, or 6/4. Moist color is 10YR 3/1, 3/2, 3/3, 4/3, or 4/4. Value of higher than 5.5 when dry and 3.5 when moist and chroma of higher than 3.5 when moist are of minor extent in some pedons. The A horizon is 20 to 27 percent clay. Organic matter content is 1 to 3 percent. Electrical conductivity is 1 to 2 millimhos per centimeter.

The C horizon has color of 7.5YR 6/4; 10YR 5/4, 6/4, 6/6, 7/3, or 7/6; 2.5Y 4/4, 6/2, or 7/4; or 5Y 6/2 or 7/4. Moist color is 7.5YR 4/4; 10YR 3/4, 4/4, 4/6, 5/3, or 5/6; 2.5Y 4/2 or 5/4; or 5Y 4/1 or 5/3. Mottles, where present, are few, fine, and distinct and have color of 10YR 3/1, 3/2, or 5/8 when moist or are few, fine, and prominent and have color of 7.5YR 3/4 or 4/6; 2.5Y 5/2, 5/6, or 7/2; 5Y 4/1 or 5/2; or N 2/0, 3/0, or 4/0 when moist. The C horizon is loam, clay loam, gravelly sandy loam, or very gravelly loam and is 10 to 30 percent clay. It is noneffervescent to strongly effervescent. Electrical conductivity is 2 to 6 millimhos per centimeter. The horizon is mildly alkaline or moderately alkaline.

Cole Variant

The Cole Variant consists of very deep, moderately well drained soils on high terraces and alluvial fans.

These soils formed in mixed alluvium derived dominantly from basic igneous rock. Slope is 2 to 5 percent.

Soils of the Cole Variant are fine, mixed, thermic Pachic Argixerolls.

Typical pedon of Cole Variant clay loam, 2 to 5 percent slopes, about 20 miles west-southwest of the city of Los Banos; 2,800 feet east and 450 feet north of the southeast corner of sec. 13, T. 12 S., R. 7 E., Mariposa Peak Quadrangle.

A1—0 to 6 inches, dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; moderate fine and medium subangular blocky structure; hard, very friable, very sticky and plastic; common very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

B21t—6 to 18 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; strong medium prismatic structure; hard, very friable, very sticky and very plastic; common very fine and few fine roots; common very fine and few fine tubular pores; few thin clay films in pores; 3.2 percent organic matter; neutral; clear smooth boundary.

B22t—18 to 32 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, very friable, very sticky and very plastic; few very fine fine, medium, and coarse roots; common very fine tubular pores; few thin clay films on peds and in pores; neutral; gradual smooth boundary.

IIC—32 to 64 inches, light yellowish brown (2.5Y 6/4) and olive yellow (2.5Y 6/6) clay loam, light olive brown (2.5Y 5/4 and 5/6) moist; few fine prominent dark brown (7.5YR 3/4) mottles, dark brown (7.5YR 3/2) moist; massive; very hard, firm, sticky and plastic; few fine, medium, and coarse roots; few very fine and fine tubular pores; mildly alkaline.

The soil is continuously saturated to a depth of 40 inches for 90 days or more in December through March of most years. Depth of the solum is 30 to 40 inches. Organic matter content is 2 to 5 percent in the A horizon and is more than 1 percent to a depth of more than 20 inches.

The A horizon has color of 10YR 3/1 or 4/1. Moist color is 10YR 2/1 or 2/2. The horizon is 28 to 35 percent clay.

The B horizon has color of 10YR 3/1, 4/1, or 4/2. Moist color is 10YR 2/1, 3/1, or 3/2. The horizon is clay or clay loam and is 35 to 45 percent clay. Reaction is neutral or mildly alkaline.

The IIC horizon has color of 10YR 5/3 or of 2.5Y 5/2, 5/4, 6/4, or 6/6. Moist color is 10YR 4/3 or 2.5Y 4/2, 4/4, 5/4, or 5/6. The horizon is stratified loam, sandy loam, clay loam, sandy clay loam, or clay and is 15 to 45 percent clay. Reaction is neutral or mildly alkaline.

Conosta Series

The Conosta series consists of moderately deep, well drained soils on foothills. These soils formed in material weathered from conglomerate. Slope is 2 to 50 percent.

Soils of the Conosta series are fine, mixed, thermic Mollic Haploxeralfs.

Typical pedon of Conosta clay loam, 15 to 30 percent slopes, 10 miles southwest of the city of Los Banos; 2,000 feet west and 500 feet north of the southeast corner of sec. 21, T. 11 S., R. 9 E., Ortigalita Peak Northwest Quadrangle.

A11—0 to 8 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; moderate very fine, fine, medium, and coarse granular structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and few fine tubular pores and common very fine interstitial pores; 10 percent gravel 2 to 20 millimeters in diameter; neutral; clear smooth boundary.

A12—8 to 14 inches; dark brown (7.5YR 3/4, dry or moist) clay loam; moderate coarse subangular blocky structure; very hard, friable, slightly sticky and plastic; common very fine roots; common very fine and few fine tubular pores; 0.8 percent organic matter; 5 percent gravel 2 to 20 millimeters in diameter; few thin clay films on peds; mildly alkaline; clear wavy boundary.

B1t—14 to 19 inches; dark brown (7.5YR 4/4) cobbly clay loam, reddish brown (5YR 4/4) moist; moderate coarse subangular blocky structure; very hard, friable, slightly sticky and plastic; few very fine roots; common very fine tubular pores; 30 percent cobbles 75 to 120 millimeters in diameter and gravel 2 to 20 millimeters in diameter; common thin clay films on peds and in pores; moderately alkaline; abrupt smooth boundary.

B2t—19 to 27 inches; strong brown (7.5YR 5/6, dry or moist) gravelly clay; moderate medium angular blocky structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 20 percent gravel 2 to 20 millimeters in

diameter; many moderately thick clay films on peds and in pores; moderately alkaline; clear wavy boundary.

C—27 to 32 inches; strong brown (7.5YR 5/6) very gravelly clay loam, strong brown (7.5Y 5/8) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 40 percent gravel 2 to 25 millimeters in diameter and cobbles 75 to 130 millimeters in diameter; many moderately thick clay films on peds; moderately alkaline.

Cr—32 inches; strongly weathered conglomerate.

The A horizon is 8 to 16 inches thick. Depth to strongly weathered conglomerate is 20 to 40 inches.

The A horizon has color of 10YR 4/4 or of 7.5YR 3/4, 4/4, or 5/4. Moist color is 10YR 3/4 or 7.5YR 3/4. The horizon is 27 to 35 percent clay and 3 to 15 percent gravel and cobbles. Reaction is neutral or mildly alkaline.

The B horizon has color of 7.5YR 4/4, 5/4, or 5/6 or of 5YR 5/4, 5/6, or 6/6. Moist color is 7.5YR 4/4, 4/6, or 5/6 or 5YR 4/4, 4/6, or 5/6. The horizon is cobbly clay loam, gravelly clay, or gravelly clay loam. It is 35 to 45 percent clay and 15 to 35 percent gravel and cobbles. Reaction is mildly alkaline or moderately alkaline.

The C horizon has color of 7.5YR 5/4, 5/6, or 6/6 or of 5YR 5/6. Moist color is 7.5YR 4/4, 5/6, or 5/8 or 5YR 4/6. The horizon is very gravelly clay loam, very gravelly clay, or very cobbly clay loam. It is 35 to 45 percent clay and 35 to 45 percent gravel and cobbles. Reaction is mildly alkaline or moderately alkaline.

Contra Costa Series

The Contra Costa series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from sandstone or shale. Slope is 30 to 65 percent.

Soils of the Contra Costa series are fine, mixed, thermic Mollic Haploxeralfs.

Typical pedon of Contra Costa loam, 30 to 50 percent slopes, about 18 miles west of the city of Los Banos; 1,300 feet south and 50 feet east of the northwest corner of sec. 35, T. 10 S., R. 7 E., Pacheco Pass Quadrangle.

A11—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse and very coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; slightly acid; clear smooth boundary.

A12—7 to 19 inches; yellowish brown (10YR 5/4) loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; very few thin clay films on peds; slightly acid; clear smooth boundary.

B2t—19 to 32 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak medium and coarse angular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; many moderately thick red (2.5YR 4/6, moist) clay films on peds; 5 percent gravel 2 to 25 millimeters in diameter; neutral; clear wavy boundary.

B3t—32 to 39 inches; brown (7.5YR 5/4) clay loam and strongly weathered shale that crushes to clay loam, dark brown (7.5YR 4/4) and brown (10YR 4/3) moist; many moderately thick reddish brown (2.5YR 4/4, moist) clay films in fractures and bridging sand grains; 10 percent angular gravel; neutral; clear wavy boundary.

R—39 inches; fractured shale.

Depth to a paralithic or lithic contact is 20 to 40 inches. Clay content of the B horizon is at least 1.2 times that of the A horizon.

The A horizon has color of 7.5YR 4/2, 4/4, or 5/2 or of 10YR 4/3, 4/4, 5/2, 5/3, or 5/4. Moist color is 7.5YR 3/2, 3/4, 4/3, 4/4, or 4/6 or 10YR 3/2, 3/3, 3/4, 4/3, or 4/4. Value of 3 when moist occurs only in the upper 4 to 7 inches. The horizon is 20 to 27 percent clay. Reaction is medium acid or neutral.

The B2t horizon has color of 5YR 4/3, 4/4, or 4/6 or of 7.5YR 4/6, 5/4, or 5/6. Moist color is 5YR 4/3, 4/4, or 4/6 or 7.5YR 4/4, 4/6, or 5/6. The horizon is clay loam or clay and is 35 to 45 percent clay. Reaction is medium acid to neutral.

Damluis Series

The Damluis series consists of very deep, well drained soils on low terraces. These soils formed in alluvium derived from various kinds of rock. Slope is 0 to 15 percent.

Soils of the Damluis series are fine, montmorillonitic, thermic Calcic Pachic Argixerolls.

Typical pedon of Damluis clay loam, 0 to 2 percent slopes, about 3 miles southwest of the community of Santa Nella; 2,500 feet south and 2,100 feet east of the northwest corner of sec. 13, T. 10 S., R. 8 E., San Luis Dam Quadrangle.

A11—0 to 11 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium and

coarse subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine roots; few very fine tubular pores; few thin pressure faces; 35 percent clay; slightly effervescent; disseminated lime; 9 percent calcium carbonate equivalent; moderately alkaline; clear wavy boundary.

A12ca—11 to 22 inches; brown (7.5YR 4/4) clay loam, dark brown (10YR 3/3 and 7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine roots; few very fine tubular pores; common thin pressure faces; 35 percent clay; strongly effervescent; lime is disseminated and is segregated as common fine filaments; 14 percent calcium carbonate equivalent moderately alkaline; clear wavy boundary.

B21tca—22 to 36 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; many moderately thick and thick clay films on peds and in pores; 50 percent clay; violently effervescent; lime is disseminated and is segregated as many fine filaments; 18 percent calcium carbonate equivalent; moderately alkaline; clear wavy boundary.

B22tca—36 to 44 inches; strong brown (7.5YR 4/6) clay, dark brown (7.5YR 3/4) and yellowish red (5YR 4/6) moist; strong medium subangular blocky structure, hard, friable, very sticky and plastic; few very fine roots; few very fine tubular pores; few thin clay films on peds and in pores; 47 percent clay; strongly effervescent; lime is disseminated and is segregated as common fine filaments; 15 percent calcium carbonate equivalent; moderately alkaline; abrupt wavy boundary.

IIC1ca—44 to 52 inches; light gray (10YR 7/2) and brownish yellow (10YR 6/8) clay loam, light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/8) moist; massive; very hard, friable, slightly sticky and plastic; no roots; common very fine tubular pores; 36 percent clay; violently effervescent; lime is disseminated and is segregated as common fine filaments; moderately alkaline; abrupt smooth boundary.

IIIC2ca—52 to 60 inches; strong brown (7.5YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; massive; soft, friable, nonsticky and nonplastic; no pores; violently effervescent; disseminated lime; 55 percent gravel 2 to 25 millimeters in diameter; moderately alkaline.

The calcium carbonate equivalent in the solum is 3 to 25 percent; it is less than 5 percent more than that of the underlying layer. The A horizon is 35 to 40 percent clay. The B2t horizon is 45 to 55 percent clay and has at least 1.2 times more clay than does the A horizon. The solum and the upper part of the C horizon are 0 to 35 percent gravel, and the lower part of the C horizon is 35 to 60 percent gravel.

The A horizon has color of 10YR 4/2, 4/3, 5/2, or 5/3 or of 7.5YR 4/2, 4/4, or 5/2. Moist color is 10YR 3/2 or 3/3 or 7.5YR 3/2. The A horizon is clay loam or gravelly clay loam. The upper part is noneffervescent to slightly effervescent. The A horizon is mildly alkaline or moderately alkaline.

The B2t horizon has color of 10YR 5/2, 5/3, or 5/4; 7.5YR 4/4, 4/6, 5/4, 5/6, or 6/6; or 5YR 5/3, 5/4, or 5/6. Moist color is 10YR 3/4, 4/2, 4/3, or 4/4; 7.5YR 3/4, 4/4, 4/6, 5/4, or 5/6; or 5YR 3/4, 4/4, or 4/6. The horizon is clay, sandy clay, gravelly clay, or gravelly sandy clay.

The IIC horizon has color of 10YR 6/8, 7/2, or 7/6 or of 7.5YR 5/6, 6/4, 6/6, 6/8, 7/6, or 7/8. Moist color is 10YR 5/8, 6/4, or 6/6 or 7.5YR 4/4, 5/6, 5/8, 6/6, or 6/8. The IIC horizon is 28 to 40 percent clay. It dominantly is clay loam or gravelly clay loam but is sandy clay loam, sandy clay, gravelly sandy clay loam, or gravelly sandy clay in some areas.

The IIIC horizon has color of 10YR 6/6, 7/6, 8/4, or 8/6 or of 7.5YR 5/6, 6/6, 6/8, or 7/6. Moist color is 10YR 4/6, 5/6, 6/6, 7/4, or 7/6 or 7.5YR 4/6, 5/6, 5/8, or 6/6. The fine earth fraction typically is very gravelly sandy loam or very gravelly sandy clay loam. Some pedons are less than 35 percent gravel. The IIIC horizon is 15 to 25 percent clay.

Damluis Variant

The Damluis Variant consists of moderately deep, well drained soils on low terraces. These soils formed in alluvium derived from various kinds of rock. Slope is 0 to 2 percent.

Soils of the Damluis Variant are fine, montmorillonitic, thermic Typic Durixerolls.

Typical pedon of Damluis Variant clay loam, about 2 miles south-southeast of the community of Santa Nella; 4,000 feet east and 300 feet south of the northwest corner of sec. 17, T. 10 S., R. 9 E., San Luis Dam Quadrangle.

Ap—0 to 6 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong medium and coarse subangular blocky structure; hard, very firm, very sticky and plastic; no roots; few very fine tubular pores; very few thin clay films on peds and bridging

sand grains; 10 percent gravel 2 to 25 millimeters in diameter; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

B21t—6 to 16 inches; dark brown (7.5YR 3/4) clay, dark brown (7.5YR 3/2) moist; strong medium, coarse, and very coarse angular blocky structure; hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; few thin clay films on peds and bridging sand grains; 10 percent gravel 2 to 6 millimeters in diameter; moderately alkaline; clear smooth boundary.

B22t—16 to 22 inches; dark brown (7.5YR 3/4) and reddish brown (5YR 4/4) clay, dark brown (7.5YR 3/2 and 3/4) moist; strong medium and coarse angular blocky structure; hard, firm, sticky and very plastic; common very fine roots; few very fine tubular pores; common thin clay films on peds and bridging sand grains; 2 percent gravel 2 to 6 millimeters in diameter; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

B3tca—22 to 32 inches; yellowish red (5YR 4/6) clay, brown (7.5YR 4/4) moist; moderate medium and coarse angular blocky structure; hard, firm, sticky and very plastic; few very fine roots; common very fine tubular pores; few thin clay films bridging sand grains; violently effervescent; lime is disseminated and is segregated as many fine seams; moderately alkaline; abrupt wavy boundary.

IIC1sim—32 to 46 inches; reddish yellow (5YR 6/6) indurated pan, yellowish red (5YR 4/6) moist; massive; 40 percent gravel 2 to 25 millimeters in diameter; slightly effervescent; lime is segregated on pebbles; moderately alkaline; gradual wavy boundary.

IIC2sim—46 to 60 inches; yellowish red (5YR 5/8) indurated pan, red (2.5YR 4/6) and strong brown (7.5YR 5/6) moist; massive; 50 percent gravel 2 to 25 millimeters in diameter; slightly effervescent; lime is segregated on pebbles; moderately alkaline; abrupt wavy boundary.

IIIC3—60 to 73 inches; light olive brown (2.5Y 5/4) very gravelly coarse sand, reddish brown (2.5YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 45 percent gravel 2 to 75 millimeters in diameter; slightly effervescent; lime is segregated on pebbles; moderately alkaline.

The solum is 25 to 40 inches thick.

The A horizon has color of 5YR 4/3, 7.5YR 4/3, or 10YR 4/2, 4/3, or 5/3. Moist color is 5YR 3/3, 7.5YR 3/2, or 10YR 3/2 or 3/3. The A horizon is 0 to 15 percent gravel and 28 to 40 percent clay. The lower boundary is abrupt or clear; where it is abrupt, the increase in the content of clay in the B horizon is less than 15 percent.

The B2t horizon has color of 5YR 4/4 or 4/6; 7.5YR 3/4 or 5/4; or 10YR 4/4, 5/3, 5/4, or 5/6. Moist color dominantly is 7.5YR 3/2 or 10YR 3/2 but is 5YR 4/4; 7.5YR 3/4 or 4/4; or 10YR 3/4, 4/3, 4/4, or 4/6 in some areas. The B2t horizon is 0 to 15 percent gravel and 40 to 55 percent clay. The B2t horizon is slightly effervescent to violently effervescent.

The indurated pan is at a depth of 25 to 40 inches and is 25 to 35 inches thick.

Deldota Series

The Deldota series consists of very deep, somewhat poorly drained soils on low alluvial fans. These soils develop wide cracks when dry. The soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Deldota series are fine, montmorillonitic, thermic Vertic Haploxerolls.

Typical pedon of Deldota clay, partially drained, about 11 miles southeast of the city of Los Banos; 2,100 feet east and 1,500 feet north of the southwest corner of sec. 11, T. 12 S., R. 11 E., Dos Palos Quadrangle.

Ap1—0 to 4 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) clay, very dark grayish brown (2.5Y 3/2) moist; strong very coarse prismatic structure and moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; common very fine roots; few very fine and fine tubular pores; less than 1 percent gravel 5 to 25 millimeters in diameter; many thick pressure faces; 42 percent clay; mildly alkaline; abrupt smooth boundary.

Ap2—4 to 9 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; strong very coarse prismatic structure and moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; common very fine roots; few very fine and fine tubular pores; many thick pressure faces; 2.3 percent organic matter; 42 percent clay; electrical conductivity is 0.6 millimhos per centimeter; exchangeable sodium percentage is 6; mildly alkaline; abrupt smooth boundary.

A1—9 to 17 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; high and low chroma mottles are present as a result of

decomposing vegetation; strong very coarse and medium prismatic structure; very hard, firm, sticky and very plastic; common very fine roots; few very fine tubular pores; many thick pressure faces; 42 percent clay; moderately alkaline; clear wavy boundary.

B2—17 to 24 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; weak very coarse and moderate medium prismatic structure; hard, friable, very sticky and very plastic; few very fine roots; common very fine tubular pores; many thin pressure faces; 37 percent clay; 9.5 percent calcium carbonate equivalent; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C1ca—24 to 30 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine roots; common very fine tubular pores; common thin pressure faces; 36 percent clay; 11 percent calcium carbonate equivalent; violently effervescent; lime is disseminated and is segregated as common fine irregular soft masses; moderately alkaline; clear wavy boundary.

C2ca—30 to 39 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and very plastic; few very fine roots; common very fine tubular pores; common thin pressure faces; 39 percent clay; 11 percent calcium carbonate equivalent; electrical conductivity is 0.6 millimhos per centimeter; exchangeable sodium percentage is 6; violently effervescent; lime is disseminated and is segregated as few fine irregular soft masses and seams; moderately alkaline; diffuse wavy boundary.

C3—39 to 68 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; gleying along root channels; few fine prominent greenish gray (5GY 6/1) mottles when moist; weak coarse subangular blocky structure; hard, friable, very sticky and plastic; few very fine roots; common very fine tubular pores; common thin pressure faces; 38 percent clay; 11 percent calcium carbonate equivalent; strongly effervescent; disseminated lime, moderately alkaline.

The water table fluctuates between depths of 42 and 60 inches. Some areas are artificially drained. The A horizon is 40 to 50 percent clay, the B horizon is 35 to 50 percent clay, and the C horizon is 30 to 40 percent clay. The calcium carbonate equivalent of the Cca horizon is 5 to 20 percent; it is less than 5 percent more than that of the C horizon. Cracks are 2 to 5 centimeters wide at the surface and 1 to 2 centimeters wide at a depth of 20 inches from July 15 to November 15 if the soil is not cropped or irrigated. The cracks are 10 to 20 inches apart.

The A horizon has color of 10YR 4/2, 5/2, or 5/3 or of 2.5Y 5/2. Moist color is 10YR 3/2 or 3/3 or 2.5Y 3/2. The organic matter content is 1 to 3 percent. The horizon is less than 5 percent gravel. The electrical conductivity is 0.1 to 1.5 millimhos per centimeter, and the exchangeable sodium percentage is 2 to 7. Reaction is mildly alkaline or moderately alkaline.

The B horizon has color of 10YR 5/4 or 5/6. Moist color is 10YR 4/3 or 4/4. The horizon is clay loam or clay. It is mildly alkaline or moderately alkaline and is noneffervescent to strongly effervescent.

The Cca horizon has color of 10YR 4/3, 4/4, or 5/4 or of 2.5Y 4/4 or 6/4. The electrical conductivity is 0.1 to 1.0 millimho per centimeter, and the exchangeable sodium percentage is 4 to 7. The horizon is mildly alkaline or moderately alkaline and is strongly effervescent or violently effervescent. Lime occurs as few or common soft masses or as seams.

The C3 horizon has color of 10YR 5/4 or 5/6 or of 2.5Y 5/6. Moist color is 10YR 4/2, 4/3, 4/4, 4/6, or 5/4 or 2.5Y 4/4. In some areas few, fine, and prominent mottles that have color of 5Y 5/2 are on peds, and in some areas gleying that has color of 5GY 6/1 is in root channels. The horizon is mildly alkaline or moderately alkaline and is slightly effervescent to violently effervescent.

Dosamigos Series

The Dosamigos series consists of very deep, somewhat poorly drained soils on low alluvial fans adjacent to the valley basin rim. These soils have a high concentration of sodium below the A horizon. The soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Dosamigos series are fine, montmorillonitic, thermic Aquic Haploxerolls.

Typical pedon of Dosamigos clay loam, partially drained, 4.5 miles south of the city of Gustine; about 130 feet south of the northeast corner of sec. 5, T. 9 S., R. 9 E., Ingomar Quadrangle.

Ap1—0 to 5 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure;

very hard, friable, sticky and very plastic; common very fine and few fine roots; common very fine tubular pores; exchangeable sodium percentage is 5; electrical conductivity is 1 millimho per centimeter; moderately alkaline; clear smooth boundary.

Ap2—5 to 14 inches; brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure; very hard, friable, very sticky and very plastic; common very fine roots; common very fine and few fine tubular pores; slightly effervescent; disseminated lime; 1.2 percent organic matter; exchangeable sodium percentage is 9; electrical conductivity is 1 millimho per centimeter; moderately alkaline; clear wavy boundary.

B21—14 to 20 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; few fine prominent black (N 2/0), dark brown (7.5YR 3/2), and dark gray (N 4/0) mottles when moist; strong medium subangular blocky structure; very hard, firm, sticky and very plastic; common very fine roots; common very fine and few fine tubular pores; few moderately thick pressure faces; slightly effervescent; disseminated lime; exchangeable sodium percentage is 16; electrical conductivity is 2 millimhos per centimeter; moderately alkaline; clear smooth boundary.

B22—20 to 29 inches; light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4) clay, yellowish brown (10YR 5/4) and brown (10YR 4/3) moist; strong medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine and few fine tubular pores; common thick pressure faces; slightly effervescent; disseminated lime; exchangeable sodium percentage is 30; electrical conductivity is 3 millimhos per centimeter; moderately alkaline; clear smooth boundary.

C1ca—29 to 46 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; many very fine and few fine tubular pores; common moderately thick clay films on peds and in pores; strongly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; exchangeable sodium percentage is 25; electrical conductivity is 3 millimhos per centimeter; moderately alkaline; clear smooth boundary.

C2ca—46 to 52 inches; yellow (10YR 7/6) clay loam, brownish yellow (10YR 6/6) moist; few fine prominent dark brown (7.5YR 4/4) mottles when moist; massive; very hard, friable, sticky and plastic; few very fine roots; few very fine and fine tubular pores; strongly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; exchangeable sodium percentage is 24; electrical conductivity is 3 millimhos per centimeter; moderately alkaline; abrupt wavy boundary.

IIC3ca—52 to 62 inches; brownish yellow (10YR 6/6) clay, yellowish brown (10YR 5/4) moist; moderate coarse prismatic structure; very hard, firm, very sticky and very plastic; no roots; few very fine tubular pores; few thin clay films on peds and in pores; strongly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; 90 percent very soft, very strongly weathered shale fragments; moderately alkaline.

The water table is at a depth of 42 to 60 inches in December through March. Some areas are artificially drained.

The A horizon has color of 10YR 4/2, 5/2, 5/3, or 5/4 or of 2.5Y 5/2 or 5/4. Moist color is 10YR 3/2 or 3/3 or 2.5Y 2/2 or 3/2. The horizon is clay loam or clay. It is 35 to 45 percent clay. The exchangeable sodium percentage is 5 to 10, and the electrical conductivity is less than 2 millimhos per centimeter.

The B2 horizon has color of 10YR 5/3, 5/4, 5/6, 6/2, 6/3, 6/4, 6/6, 7/4, or 7/6 or of 2.5Y 4/2, 4/4, 6/2, or 6/4. Moist color is 10YR 3/4, 4/1, 4/3, 4/4, 4/6, 5/4, 5/6, or 6/6 or 2.5Y 4/4. Mottles when moist are few, fine, and prominent and have color of 7.5YR 3/2, 3/4, or 4/2; 10YR 3/1 or 5/6; 2.5Y 2/1 or 4/2; 5Y 4/1 or 5/1; 5GY 4/1; or N 2/0 or 4/0. Mottles are at a depth of 30 inches or less. The B2 horizon is clay or clay loam. It is 37 to 50 percent clay The exchangeable sodium percentage is 10 to 30, and the electrical conductivity is 2 to 8 millimhos per centimeter.

The C horizon has color of 10YR 5/4, 5/6, 6/4, 6/6, 7/3, 7/6, 8/2, or 8/6 or of 2.5Y 5/4, 6/4, 6/6, 7/6, or 8/4. Moist color is 10YR 4/2, 4/6, 5/3, 5/4, 5/6, 6/4, 6/6, 7/2, or 7/6 or 2.5Y 5/4, 6/6, or 7/4. Mottles when moist are few, fine, and prominent and have color of 7.5YR 3/2, 3/4, 4/4, or 5/6; 10YR 2/1, 4/2, or 5/6; 2.5Y 3/2, 5/4, or 7/6; 5Y 3/2, 4/1, 5/1, 5/3, 6/1, or 6/3; 5GY 4/1; or N 2/0. The C horizon is clay loam, clay, or sandy clay and s 30 to 45 percent clay. The lower part of the C horizon is noneffervescent to strongly effervescent. The exchangeable sodium percentage of the C horizon is 10 to 30, and the electrical conductivity is 2 to 16 millimhos per centimeter. Some pedons contain as much as 10 percent brittle durinodes. Some pedons do not have strongly weathered shale fragments.

Dospalos Series

The Dospalos series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Dospalos series are fine, montmorillonitic (calcareous), thermic Vertic Haplaquolls.

Typical pedon of Dospalos clay loam, partially drained, about 5 miles east-northeast of the city of Los Banos; 1,400 feet north and 200 feet east of the southwest corner of sec. 3, T. 10 S., R. 11 E., Los Banos Quadrangle.

Ap—0 to 9 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; common fine prominent light gray (10YR 7/1) mottles when dry or moist; strong fine and medium granular structure; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular and interstitial pores, strongly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; moderately alkaline; abrupt smooth boundary.

A12—9 to 24 inches; dark gray (N 4/0) clay loam, black (N 2/0) moist; common fine prominent white (10YR 8/1) and light brownish gray (2.5Y 6/2) mottles, white (10YR 8/1) and grayish brown (2.5Y 5/2) moist; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many moderately thick pressure faces on peds; strongly effervescent; lime is disseminated and is segregated as many medium irregular soft masses; moderately alkaline; clear wavy boundary.

A3gca—24 to 27 inches; gray (5Y 5/1 and 6/1) clay, very dark gray (5Y 3/1) and dark gray (5Y 4/1) moist; common medium distinct white (5Y 8/1) mottles, common medium prominent white (5Y 8/2) moist; strong medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; many moderately thick pressure faces on peds; violently effervescent; lime is disseminated and is segregated as many medium irregular soft masses; moderately alkaline; clear wavy boundary.

B2g—27 to 37 inches; pale olive (5Y 6/3) clay, olive (5Y 4/3) moist; common fine prominent light olive brown (2.5Y 5/6) mottles, common medium prominent light olive brown (2.5Y 5/6) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; common moderately thick pressure faces on peds; slightly effervescent; disseminated lime; moderately alkaline; diffuse smooth boundary.

C1—37 to 54 inches; light yellowish brown (2.5Y 6/4) clay loam, dark grayish brown (2.5Y 4/2) moist; common medium prominent brownish yellow (10YR 6/8) mottles, common medium prominent yellowish brown (10YR 5/8) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and few fine tubular pores; common thin pressure faces on peds; slightly effervescent; disseminated lime; moderately alkaline; diffuse wavy boundary.

C2—54 to 62 inches; light yellowish brown (2.5Y 6/4) sandy clay loam, grayish brown (2.5Y 5/2) moist; common medium prominent brownish yellow (10YR 6/8) and very dark gray (10YR 3/1) mottles, common large prominent yellowish brown (10YR 5/8) moist; massive; slightly hard, friable, slightly sticky and plastic; common very fine and few fine tubular pores; few thin pressure faces; moderately alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. The thickness of the mollic epipedon ranges from 24 to 33 inches because of land leveling. The 10- to 40-inch control section averages 35 to 50 percent clay, but it ranges to as much as 60 percent clay. Organic matter content is 1 to 3 percent in the upper 24 inches, and it decreases regularly with increasing depth. Calcium carbonate equivalent of the profile is less than 15 percent throughout, and it typically decreases with increasing depth. The soils have cracks that are 0.75 to 1.00 inch wide at the surface and 0.50 to 0.75 inch at a depth of 20 inches. There are no sphenoids or intersecting slickensides. Salinity generally is less than 2 millimhos per centimeter but is 4 to 16 millimhos per centimeter throughout in some pedons. The profile is slightly effervescent to violently effervescent. Disseminated lime is at a depth of 10 to 40 inches or more.

The A horizon has color of 10YR 2/1, 3/1, 4/1, or 5/3; N 4/0; 2.5Y 4/2; or 5Y 3/2, 4/1, 5/1, or 6/1. Moist color is 10YR 2/1, 3/1, 3/2, 4/1, or 5/1; 2.5Y 2/2; 5Y 3/1, 3/2, or 4/1; or N 2/0 or 3/0. The horizon is clay loam or clay and is mildly alkaline or moderately alkaline.

The B horizon is 5Y 6/1, 6/2, or 6/3. Moist color is 10YR 4/3 or 5/3; 2.5Y 4/2; or 5Y 4/1, 4/2, 4/3, 5/1, or 5/3. It is clay loam or clay and typically is 35 to 60

percent clay. The exchangeable sodium percentage averages less than 3, but it ranges to as much as 14. The horizon is slightly effervescent or strongly effervescent.

The C horizon has color of 10YR 5/2 or 5/4; 2.5Y 5/4, 5/6, or 6/4; or 5Y 5/2 or 5/3. Moist color is 2.5Y 4/2 or 5/2. The horizon is sandy clay loam, clay loam, or clay.

Edminster Series

The Edminster series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Edminster series are fine-loamy, mixed, thermic Glossic Natraqualfs.

Typical pedon of Edminster loam, about 17 miles north of the city of Los Banos; 4,400 feet east and 800 feet north of the southwest corner of sec. 35, T. 7 S., R. 10 E., Stevenson Quadrangle.

A1—0 to 1 inch; gray (N 5/0) loam, dark gray (N 4/0) moist; moderate fine granular structure; soft, friable, very sticky and plastic; common very fine roots; few very fine tubular pores; slightly acid; abrupt smooth boundary.

A2—1 to 4 inches; gray (10YR 6/1 and N 5/0) loam, gray (10YR 5/1) and dark gray (N 4/0) moist; strong medium prismatic structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds and in pores; neutral; abrupt irregular boundary.

B21t—4 to 9 inches; gray (5Y 5/1) and olive (5Y 5/3) clay loam, dark gray (5Y 4/1) and olive gray (5Y 5/2) moist; strong medium prismatic structure; very hard, firm, sticky and very plastic; few very fine roots; common very fine tubular pores; clean sand grains coat prisms; many moderately thick clay films on peds and many thick clay films in pores; slightly effervescent; lime is disseminated and is segregated as few fine soft masses; exchangeable sodium percentage is 20; strongly alkaline; clear wavy boundary.

B22tca—9 to 18 inches; olive gray (5Y 4/2) clay loam, very dark gray (5Y 3/1) moist; common medium distinct dark gray (N 4/0) mottles, black (2.5Y 2/2) moist; moderate medium prismatic structure; very hard, very firm, sticky and very plastic; few fine and medium roots; few very fine tubular pores; clean sand grains coat prisms; many thick clay films on peds and in pores; strongly effervescent; disseminated lime; exchangeable sodium percentage is 16; strongly alkaline; clear wavy boundary.

B3tca—18 to 26 inches; grayish brown (2.5Y 5/2) clay loam, gray (5Y 5/1) moist; many medium prominent light gray (2.5Y 7/2 and 5Y 7/2) mottles, common fine distinct dark gray (5Y 4/1) and light brownish gray (2.5Y 6/2) moist; weak fine prismatic structure; very hard, very firm, sticky and plastic; no roots; common very fine tubular pores; many thick clay films on peds and in pores; slightly effervescent; lime is disseminated and is segregated as common fine concretions; exchangeable sodium percentage is 15; moderately alkaline; clear wavy boundary.

C1—26 to 39 inches; grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium angular blocky structure; hard, very firm, sticky and very plastic; common very fine tubular pores; many moderately thick clay films on peds and staining mineral grains; strongly effervescent; lime is disseminated and is segregated as common medium concretions; exchangeable sodium percentage is 10; strongly alkaline; clear wavy boundary.

IIC2ca—39 to 50 inches; pale yellow (5Y 7/3) and light olive gray (5Y 6/2) clay loam, greenish gray (5GY 5/1) and olive (5Y 5/3) moist; few fine prominent olive yellow (2.5Y 6/6) mottles, common fine prominent yellowish brown (10YR 5/8) and light gray (10YR 7/2) and few fine prominent brownish yellow (10YR 6/6) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common very fine tubular pores; many moderately thick clay and silt films on peds and staining mineral grains; strongly effervescent; lime is disseminated and is segregated as common fine and medium concretions; exchangeable sodium percentage is 7; strongly alkaline; clear wavy boundary.

IIIC3—50 to 60 inches; pale yellow (5Y 8/3) loam, olive (5Y 5/3) moist; many fine prominent brownish yellow (10YR 6/6) mottles, yellowish brown (10YR 5/8) moist; massive; slightly hard, friable, sticky and plastic; common very fine tubular pores; many moderately thick clay films in pores; slightly effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline.

These soils are saturated with stagnant water for at least a few days annually. The depth to the natric

horizon is 2 to 6 inches. Organic matter content is less than 1 percent throughout the profile.

The A1 horizon has color of 10YR 4/1, 4/2, 5/1, or 5/2 or of N 4/0 or 5/0. Moist color is 10YR 3/1, 3/2, 4/1, or 4/2 or N 3/0 or 4/0. The horizon is 10 to 20 percent clay. It is slightly acid or neutral. Some pedons do not have an A1 horizon.

The A2 horizon has color of 10YR 5/1, 6/1, or 7/1 or of N 5/0. Moist color is 10YR 3/1, 3/2, 4/1, 4/2, or 5/1 or N 4/0. The horizon is sandy loam or loam and is neutral or mildly alkaline.

The Bt horizon has color of 10YR 3/2; 2.5Y 5/2, 6/2, or 6/4; or 5Y 4/2, 5/1, 5/2, 5/3, 6/2, or 6/3. Moist color is 2.5Y 3/2; 5Y 3/1, 4/1, 5/1, or 5/2; or 10YR 3/1, 3/2, or 4/2. The horizon is loam or clay loam. It averages 30 to 34 percent clay, but it is 25 to 35 percent clay in some pedons. The electrical conductivity is 2 to 8 millimhos per centimeter. The exchangeable sodium percentage is 15 to 35. The calcium carbonate equivalent is 2 to 12 percent. The Bt horizon is moderately alkaline or strongly alkaline.

The C horizon has color of 2.5Y 5/2, 6/2, or 6/4 or of 5Y 5/3, 6/2, 7/3, or 8/3. Moist color is 2.5Y 3/2 or 4/2; 5Y 4/3 or 5/3; 10YR 4/3 or 5/4; or 5GY 5/1. The horizon is sandy loam, loam, sandy clay loam, or clay loam and is stratified in some pedons. It is 10 to 30 percent clay. The exchangeable sodium percentage is 5 to 25. The horizon is moderately alkaline or strongly alkaline. The calcium carbonate equivalent is 2 to 12 percent.

Edminster Variant

The Edminster Variant consists of very deep, poorly drained soils on flood plains. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Edminster Variant are sandy over loamy, mixed, thermic Aquic Xerofluvents.

Typical pedon of Edminster Variant sand, about 6 miles east of the city of Gustine; 2,200 feet south and 400 feet west of the northeast corner of sec. 5, T. 8 S., R. 10 E., Gustine Quadrangle.

A1—0 to 16 inches; brown (10YR 5/3) sand, dark brown (10YR 3/3) moist; massive; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

C—16 to 25 inches; light yellowish brown (10YR 6/4) sand, brown (10YR 4/3) moist; massive; soft, loose, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

IIB1tca—25 to 31 inches; yellowish brown (10YR 5/6) sandy loam, dark yellowish brown (10YR 4/4) moist; few fine distinct light gray (10YR 7/2) mottles, black (10YR 2/1) moist; weak medium and coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; thin coatings of sand grains on peds; common thin clay films on peds; slightly effervescent; lime is disseminated and is segregated as common fine irregular soft masses; moderately alkaline; abrupt wavy boundary.

IIB2tca—31 to 60 inches; very pale brown (10YR 8/3) silt loam, grayish brown (2.5Y 5/2) moist; few fine distinct very dark gray (10YR 3/1) and yellow (10YR 7/8) mottles, common fine prominent brownish yellow (10YR 6/6) moist; weak medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; many thin clay films on peds; slightly effervescent; lime is disseminated and is segregated as common fine and medium irregular soft masses; moderately alkaline.

Organic matter content is less than 1 percent in the A horizon, and it decreases irregularly with increasing depth. The thickness of the A and C horizons is 20 to 30 inches.

The A horizon has color of 10YR 4/2, 5/3, 6/2, or 6/3. Moist color is 10YR 3/3 or 4/3. The horizon is 0 to 5 percent clay.

The C horizon has color of 10YR 6/2, 6/4, 7/2, or 7/4. Moist color is 10YR 4/3, 5/4, or 6/4. The horizon is sand or loamy sand and is 0 to 10 percent clay.

The IIB horizon has color of 10YR 5/6 or 8/3 or of 2.5Y 6/2. Moist color is 7.5YR 4/6 or 5/6, 10YR 4/4, or 2.5Y 5/2. The horizon is sandy loam or silt loam and is 15 to 25 percent clay.

Elnido Series

The Elnido series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Elnido series are coarse-loamy, mixed, thermic Typic Haplaquolls.

Typical pedon of Elnido sandy loam, partially drained, about 5 miles northeast of the city of Los Banos; 2,200 feet north and 800 feet east of the southwest corner of sec. 33, T. 9 S., R. 11 E., Los Banos Quadrangle.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) moist; weak

medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; many very fine interstitial pores and few fine tubular pores; moderately alkaline; gradual smooth boundary.

A12—10 to 18 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; few medium distinct dark yellowish brown (10YR 3/4) mottles when moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few very fine roots; many very fine interstitial pores; moderately alkaline; abrupt smooth boundary.

B2g—18 to 27 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; common medium prominent brown (7.5YR 4/4) mottles when moist, weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; moderately alkaline; gradual smooth boundary.

Cg—27 to 60 inches; grayish brown (2.5Y 5/2) sandy loam, dark olive gray (5Y 3/2) moist; few fine prominent brown (7.5YR 4/4) mottles when moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; moderately alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. The thickness of the mollic epipedon is 10 to 22 inches. The 10- to 40-inch control section averages 8 to 16 percent clay, but it ranges from 5 to 18 percent clay. Organic matter content is 1 to 3 percent in the upper 10 to 22 inches, and it decreases regularly to less than 1 percent at a depth of 22 inches.

The A horizon has color of 10YR 4/1, 4/2, 4/3, 5/2, or 5/3 or of 2.5Y 4/2. Moist color is 10YR 2/2, 3/1, or 3/2 or 2.5Y 3/2. Some pedons do not have mottles. The horizon is sandy loam or clay loam. It is neutral to moderately alkaline.

The Bg horizon has color of 10YR 4/3, 5/2, or 5/3 or of 2.5Y 5/2 or 6/2. Moist color is 10YR 4/2, 4/4, or 5/4; 2.5Y 4/2; or 5YR 4/1. The horizon is sandy loam, loam, or silt loam. It is neutral to moderately alkaline. Some pedons do not have a Bg horizon.

The Cg horizon has color of 10YR 5/3, 6/3, or 7/2; 2.5Y 5/2 or 6/2; or 5Y 6/2 or 6/3. Moist color is 10YR 4/3, 5/3, or 5/4; 2.5Y 4/2 or 4/4; or 5Y 3/2, 4/1, 4/2, 5/2, or 5/3. Some pedons do not have mottles. The horizon is sandy loam, loam, silt loam, loamy sand, or sand and is stratified in some pedons. It is calcareous in some pedons and is neutral to strongly alkaline.

Escano Series

The Escano series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Escano series are fine-loamy, mixed (calcareous), thermic Typic Haplaquolls.

Typical pedon of Escano clay loam, partially drained, about 14 miles east of the city of Los Banos; 1,000 feet east and 1,500 feet south of the northwest corner of sec. 7, T. 10 S., R. 13 E., Santa Rita Bridge Quadrangle.

Ap—0 to 10 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak medium angular blocky structure parting to weak medium granular; hard, firm, sticky and plastic; common very fine and fine roots; many very fine pores; moderately alkaline; abrupt smooth boundary.

A12—10 to 17 inches; dark gray (N 4/0) and very dark gray (N 3/0) clay loam, very dark gray (N 3/0 and 5Y 3/1) and olive gray (5Y 4/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; common very fine and fine roots; few very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; clear wavy boundary.

B2t—17 to 22 inches; olive gray (5Y 5/2) and pale olive (5Y 6/3) clay loam, dark gray (5Y 4/1) and olive gray (5Y 4/2) moist; many medium prominent light gray (5Y 7/2) mottles, pale yellow (5Y 7/3) moist; strong fine prismatic structure; slightly hard, firm, sticky and plastic; few very fine and common fine roots; common very fine tubular pores; many moderately thick clay films on peds; strongly effervescent; lime is disseminated and is segregated as common medium irregular soft masses; 8 percent calcium carbonate equivalent; moderately alkaline; clear wavy boundary.

C1ca—22 to 29 inches; olive (5Y 5/3) clay loam, olive gray (5Y 4/2) moist; common medium distinct light gray (5Y 7/2) mottles, common medium prominent pale yellow (5Y 7/3) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular and interstitial pores; few thin clay films on peds and staining mineral grains; strongly effervescent; lime is disseminated and is

segregated as few fine irregular soft masses; 8 percent calcium carbonate equivalent; moderately alkaline; abrupt wavy boundary.

C2ca—29 to 51 inches; white (10YR 8/1) and pale olive (5Y 6/3) clay loam, light gray (5Y 7/2) and olive gray (5Y 5/2) moist; massive; slightly hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular and interstitial pores; violently effervescent; lime is disseminated and is segregated as many large irregular soft masses; 48 percent calcium carbonate equivalent; moderately alkaline, abrupt irregular boundary.

C3ca—51 to 60 inches; pale olive (5Y 6/3) and white (10YR 8/1) loam, light olive brown (2.5Y 5/4) and light gray (5Y 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common very fine tubular and interstitial pores; strongly effervescent; lime is disseminated and is segregated as many medium irregular soft masses; 20 percent calcium carbonate equivalent; moderately alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. The depth to the calcic horizon is 25 to 39 inches. The thickness of the mollic epipedon is 10 to 20 inches. The 10- to 40-inch control section averages 28 to 33 percent clay, but it ranges from 20 to 35 percent clay. Organic matter content is 1 to 3 percent in the upper 10 to 20 inches, and it decreases regularly to less than 1 percent below a depth of 20 inches. Exchangeable sodium percentage increases with increasing depth. Some pedons do not have a C1ca horizon.

The A horizon has color of 10YR 3/1, 4/1, 4/2, or 5/2; 2.5Y 5/2; or N 3/0 or 4/0, and it is mottled in some pedons. Moist color is 10YR 2/1, 3/1, or 3/2; 5Y 2/2, 3/1, or 4/2; N 3/0; or 2.5Y 3/2. The horizon is mildly alkaline or moderately alkaline and is calcareous in some pedons. Some pedons do not have an A12 horizon.

The Bt horizon has color of 2.5Y 5/2 or 5Y 5/2 or 6/3, and it has distinct or prominent mottles in some pedons. Moist color is 2.5Y 4/2 or 5Y 4/1, 4/2, or 4/3. The horizon is clay loam, loam, or silt loam. The electrical conductivity of the saturation extract is less than 1.2 millimhos per centimeter, and the exchangeable sodium percentage is less than 5.

The C2ca horizon has color of 10YR 8/1 or 5Y 6/2, 6/3, or 7/1 Moist color is 5Y 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, 6/3, or 7/2 or 2.5Y 4/2, 5/2, 7/2, or 8/2. Some pedons are mottled. Value depends on the content of lime, which typically is 30 to 50 percent but ranges to as little as 15 percent.

The C3ca horizon is stratified loam and clay loam.

Fifield Series

The Fifield series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from sedimentary or metamorphic rock. Slope is 30 to 65 percent.

Soils of the Fifield series are loamy-skeletal, mixed, thermic Ultic Argixerolls.

Typical pedon of a Fifield sandy loam in an area of Fifield-Honker-Gonzaga complex, 50 to 65 percent slopes, about 21 miles west of the city of Los Banos; 2 miles north of California Highway 152, 800 feet west and 200 feet north of the southeast corner of sec. 6, T. 10 S., R. 7 E. (projected section lines from sec. 31, T. 9 S., R. 7 E.), Pacheco Pass Quadrangle.

A1—0 to 5 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; strong fine subangular blocky structure; soft, friable, nonsticky and slightly plastic; common very fine and fine roots; common very fine interstitial pores; 10 percent angular gravel 2 to 20 millimeters in diameter; 3.9 percent organic matter; 9 percent clay; neutral; clear smooth boundary.

B2t—5 to 15 inches; yellowish brown (10YR 5/4) very gravelly loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores; common thin clay films in pores; 40 percent angular gravel and cobbles; 1.8 percent organic matter; 19 percent clay; strongly acid; clear irregular boundary.

C1—15 to 22 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, slightly sticky and plastic; few fine and very fine roots; no pores; 75 percent angular gravel and 10 percent angular cobbles; 18 percent clay; medium acid; clear irregular boundary.

C2—22 to 30 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, slightly sticky and plastic; few fine roots; 75 percent angular gravel and 10 percent angular cobbles; 21 percent clay; medium acid; abrupt irregular boundary.

R—30 inches; slightly weathered, fractured sandstone.

Depth to a lithic contact is 20 to 35 inches. In some pedons the surface is covered with as much as 3 inches of organic litter. Typically, the mollic epipedon extends into the B2t horizon. Organic matter content is 1 to 5 percent to a depth of at least 7 inches.

The A1 horizon has color of 7.5YR 4/2, 4/4, or 5/2 or of 10YR 4/3, 5/2, 5/3, or 5/4. Moist color is 7.5YR 3/2 or 10YR 2/2, 3/1, 3/2, or 3/3. The horizon is 5 to 15 percent clay and 5 to 15 percent angular gravel and cobbles. Reaction is medium acid to neutral. Base saturation (sum of cations) is 50 to 75 percent.

The B2t horizon has color of 7.5YR 4/4, 5/2, or 5/4 or of 10YR 5/2, 5/3, 5/4, 6/3, or 6/4. Moist color is 7.5YR 3/2 or 3/4 or 10YR 2/2, 3/1, 3/2, 3/3, 3/4, 4/3, or 4/4. The horizon is very gravelly loam or very gravelly sandy clay loam. It is 18 to 25 percent clay and 35 to 55 percent angular gravel and cobbles. Reaction is strongly acid to slightly acid. Base saturation is 40 to 75 percent.

The C horizon is very gravelly or extremely gravelly loam or extremely gravelly sandy loam. It is 18 to 25 percent clay, 55 to 75 percent angular gravel, and 5 to 15 percent angular cobbles. Reaction is strongly acid to slightly acid.

Fluvaquents

Fluvaquents consist of deep, very poorly drained soils in rivers and stream channels and on lake bottoms. These soils formed in mixed, stratified alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Reference pedon of Fluvaquents, channeled, about 7.6 miles north-northeast of the city of Dos Palos; 3,600 feet east and 700 feet north of the southwest corner of sec. 5, T. 10 S., R. 13 E., Santa Rita Bridge Quadrangle.

A1—0 to 10 inches; light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) loamy coarse sand, pale yellow (2.5Y 7/4) and light yellowish brown (2.5Y 6/4) moist; common fine prominent yellow (10YR 7/6) mottles, strong brown (7.5YR 5/8) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; slightly acid; abrupt smooth boundary.

IIC1—10 to 25 inches; gray (5Y 6/1 and 5/1) loamy sand, dark greenish gray (5BG 4/1) and dark bluish gray (5B 4/1) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; moderately alkaline; abrupt smooth boundary.

IIIC2—25 to 60 inches; gray (5Y 6/1 and 5/1), stratified loamy coarse sand, silt loam, loam, and loamy fine sand (layers vary in thickness; some are less than 1 inch thick), dark greenish gray (5BG 4/1) and dark bluish gray (5B 4/1) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; mildly alkaline.

These soils are extremely variable in their characteristics. The profile is saturated during most of the year by water from the San Joaquin River and stream channels and by stagnant surface water. The profile is slightly acid to moderately alkaline throughout. It is stratified loamy coarse sand to clay loam and is 0 to 10 percent angular gravel 2 to 5 millimeters in diameter.

Franciscan Series

The Franciscan series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from fractured sedimentary and metamorphic rock. Slope is 30 to 75 percent.

Soils of the Franciscan series are fine-loamy, mixed, thermic Typic Argixerolls.

Typical pedon of Franciscan sandy loam, 50 to 70 percent slopes, about 11 miles west-southwest of the city of Gustine; 1,600 feet east and 1,200 feet south of the northwest corner of sec. 11, T. 9 S., R. 7 E., Crevison Peak Quadrangle.

A11—0 to 2 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; loose, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores; slightly acid; abrupt smooth boundary.

A12—2 to 10 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine tubular pores; 10 percent gravel 2 to 50 millimeters in diameter; 3.6 percent organic matter; slightly acid; clear smooth boundary.

B1t—10 to 19 inches; brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and common fine and medium tubular pores; few thin clay films on peds; neutral; clear wavy boundary.

B21t—19 to 26 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, very sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and common fine tubular pores; common moderately thick clay films on peds; neutral; clear smooth boundary.

B22t—26 to 34 inches; brown (7.5YR 5/4) gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; few very fine and fine tubular pores; few thin clay films on peds; 30 percent grave and cobbles 25 to 150 millimeters in diameter; neutral; clear smooth boundary.

C—34 to 38 inches; strong brown (7.5YR 4/6) and light yellowish brown (10YR 6/4) gravelly sandy clay loam, brown (7.5YR 4/4) and yellowish brown (10YR 5/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; few very fine interstitial pores; few thin clay films bridging sand grains; 30 percent angular gravel 25 to 75 millimeters in diameter; neutral; clear smooth boundary.

R—38 inches; fractured sandstone and metamorphic rock.

Depth to a lithic contact is 20 to 40 inches. The mollic epipedon is 8 to 15 inches thick and is at least one-third as thick as the solum. The profile is slightly acid or neutral throughout.

The A horizon has color of 7.5YR 4/4, 5/3, or 5/4 or of 10YR 3/3, 4/3, 5/2, 5/3, or 5/4. Moist color is 7.5YR 3/2 or 3/3 or 10YR 2/2, 3/2, or 3/3. The horizon is sandy loam or loam. It is 10 to 20 percent clay and as much as 10 percent angular gravel. Organic matter content is 2 to 4 percent.

The B2t horizon has color of 7.5YR 5/4, 5/6, or 6/4 or of 10YR 4/3, 5/3, 5/4, 6/3, 6/4, or 6/6. Moist color is 7.5YR 3/4, 4/4, or 4/6 or 10YR 3/4, 4/3, 4/4, or 4/6. The horizon is sandy clay loam, clay loam, gravelly sandy clay loam, or gravelly clay loam. It is 20 to 35 percent clay and has at least 1.2 times more clay than does the A horizon. The particle size control section is 40 to 65 percent sand. It is 5 to 35 percent gravel, typically increasing with increasing depth, and as much as 5 percent cobbles.

The C horizon has color of 7.5YR 4/6 or 5/6 or of 10YR 5/4, 6/4, or 6/6. Moist color is 7.5YR 3/4, 4/4, or 4/6 or 10YR 4/4, 5/4, or 5/6. It is gravelly sandy clay loam or gravelly clay loam. It is 20 to 35 percent clay, 15 to 35 percent angular gravel, and as much as 5 percent cobbles. Some pedons do not have a C horizon.

The underlying bedrock is fractured in the upper 6 inches. The upper part of the fractures is filled with soil material.

Gonzaga Series

The Gonzaga series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from sedimentary or metamorphic rock. Slope is 30 to 65 percent.

Soils of the Gonzaga series are fine, mixed, thermic Typic Palexerolls.

Typical pedon of a Gonzaga loam in an area of Gonzaga-Honker complex, 50 to 65 percent slopes, about 14 miles west of the city of Los Banos; 3,000 feet south and 2,400 feet west of the southeast corner of sec. 34, T. 9 S., R. 7 E., Pacheco Pass Quadrangle.

A11—0 to 7 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots and few fine and medium roots; common very fine, medium, and coarse and few fine tubular pores; 10 percent gravel 2 to 15 millimeters in diameter; 4.1 percent organic matter; 22 percent clay; neutral; clear smooth boundary.

A12—7 to 16 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; common very fine and medium and many fine tubular pores; 10 percent gravel 2 to 15 millimeters in diameter; 2.8 percent organic matter; 21 percent clay; neutral; clear smooth boundary.

A3—16 to 22 inches; brown (7.5YR 5/4) gravelly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine, fine, and medium roots; common very fine and fine tubular pores; few thin clay films in pores; 25 percent gravel and cobbles 2 to 130 millimeters in diameter; 24 percent clay; neutral; abrupt wavy boundary.

B21t—22 to 31 inches; yellowish red (5YR 4/6, dry or moist) gravelly sandy clay; moderate medium prismatic structure parting to strong medium angular blocky; hard, firm, very sticky and plastic; few very

fine, fine, medium, and coarse roots; few very fine and fine tubular pores; common thick clay films bridging sand grains; many thick pressure faces; 20 percent angular gravel 2 to 20 millimeters in diameter; 41 percent clay; neutral; clear smooth boundary.

B22t—31 to 39 inches; strong brown (7.5YR 5/6, dry or moist) gravelly sandy clay; moderate coarse angular blocky structure parting to moderate fine angular blocky; hard, firm, very sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine and fine tubular pores; many thick clay films in pores; 25 percent angular gravel 2 to 25 millimeters in diameter; 40 percent clay; neutral; clear irregular boundary.

R1—39 to 43 inches; strong brown (7.5YR 5/6), slightly weathered, strongly fractured siltstone; some soil material in fractures; many thick clay films in fractures; clear wavy boundary.

R2—43 inches; unweathered, strongly fractured siltstone.

Depth to a lithic contact is 20 to 40 inches. Depth to an abrupt increase in the content of clay is 12 to 24 inches. Organic matter content is 1 to 5 percent in the upper 10 inches. The B horizon has 15 to 30 percent more clay (absolute) than does the A horizon.

The A11 and A12 horizons have color of 5YR 5/3, 7.5YR 5/2 or 5/4, or 10YR 4/3, 5/2, 5/3, or 5/4. Moist color is 5YR 3/3, 7.5YR 3/2, or 10YR 3/2 or 3/3. These horizons are 15 to 27 percent clay and 0 to 15 percent gravel. Reaction is slightly acid or neutral.

The A3 horizon has color of 5YR 5/4, 7.5YR 5/4, or 10YR 5/4. Moist color is 5YR 3/4, 7.5YR 3/4, or 10YR 3/4. The horizon is gravelly loam or gravelly sandy clay loam. It is 15 to 27 percent clay and 15 to 30 percent gravel and cobbles.

The Bt horizon has color of 5YR 4/6 or 5/4 or of 7.5YR 4/6, 5/4, or 5/6. Moist color is 5YR 4/3, 4/4, 4/6, or 5/6 or 7.5YR 4/4, 4/6, or 5/6. The horizon is gravelly sandy clay, gravelly clay, or gravelly clay loam. It is 35 to 55 percent clay and 15 to 30 percent angular gravel and cobbles. Reaction is neutral or mildly alkaline.

Henmel Series

The Henmel series consists of very deep, poorly drained soils on low alluvial fans adjacent to the valley basin rim. Drainage has been altered by the use of open ditches. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Henmel series are fine, montmorillonitic, thermic Typic Argiaquolls.

Typical pedon of Henmel clay loam, partially drained, about 3 miles north of the city of Los Banos; 2,400 feet east and 2,300 feet north of the southwest corner of sec. 34, T. 9 S., R. 10 E., Los Banos Quadrangle.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine roots; few very fine tubular pores; 28 percent clay; electrical conductivity is 1.4 millimhos per centimeter; exchangeable sodium percentage is 7; moderately alkaline; clear smooth boundary.

A12—6 to 15 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; common fine prominent dark yellowish brown (10YR 4/6) and gray (5Y 5/1) mottles, dark brown (10YR 4/3) and dark olive gray (5Y 3/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine and fine roots; few very fine tubular pores; 28 percent clay; very few thin clay films bridging sand grains; moderately alkaline; clear wavy boundary.

B21t—15 to 22 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; common fine prominent dark yellowish brown (10YR 4/4) and gray (5Y 5/1) mottles, many fine prominent dark brown (10YR 4/3) and dark olive gray (5Y 3/2) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic; common very fine and few fine roots; few very fine and fine tubular pores; 35 percent clay; electrical conductivity is 1.2 millimhos per centimeter; exchangeable sodium percentage is 7; few thin clay films on peds; moderately alkaline; clear smooth boundary.

B22t—22 to 37 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; common fine prominent dark yellowish brown (10YR 4/4) and gray (5Y 5/1) mottles, common fine distinct dark grayish brown (2.5Y 4/2) and very dark gray (5Y 3/1) moist; strong coarse prismatic structure; hard, very firm, sticky and very plastic; few very fine roots; common very fine and fine tubular pores; 41 percent clay; common thin clay films on peds; electrical conductivity is 1.5 millimhos per centimeter; exchangeable sodium percentage is 9; moderately alkaline; gradual smooth boundary.

IIB3tca—37 to 44 inches; dark grayish brown (10YR 4/2) sandy clay, very dark grayish brown (2.5Y 3/2) moist; common fine prominent gray (5Y 5/1)

mottles, common fine distinct very dark gray (5Y 3/1) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; 36 percent clay; common thin clay films on peds; electrical conductivity is 1.6 millimhos per centimeter; exchangeable sod um percentage is 10; slightly effervescent; lime is disseminated and is segregated as few fine filaments; moderately alkaline; c ear smooth boundary.

IICca—44 to 66 inches; dark brown (10YR 3/3) sandy oam, brown (10YR 4/3) moist; few fine distinct dark yel owish brown (10YR 4/6) mottles, common fine prominent olive gray (5Y 5/2), few fine prominent very dark gray (5Y 3/1), and common medium prominent gray (5Y 5/1) moist; massive; slightly hard, friable slightly sticky and plastic; no roots; common very fine tubular pores; 19 percent clay; few thin clay films bridging sand grains; slightly effervescent; lime is disseminated and is segregated as few fine filaments; moderately alkaline.

The A horizon has color of 10YR 4/2, 4/3, 4/4, 5/2, or 5/3 or of 2.5Y 4/2 or 5/2. Moist color is 10YR 3/2 or 2.5Y 3/2. The A horizon is 27 to 35 percent clay. Organic matter content is 1 to 3 percent. Some pedons are slightly effervescent.

The B2t horizon has color of 10YR 4/2, 4/3, or 5/3 or of 2.5Y 5/2. Moist color is 10YR 3/2, 3/3, 4/3, 4/4, or 5/4 or 2.5Y 3/2, 4/2, or 4/4. The horizon is silty clay loam, silty clay, or clay. It is 35 to 45 percent clay and has 1.2 times more clay than does the A horizon. The B2t horizon is slightly effervescent or strongly effervescent in some pedons. The IIB3tca horizon may be absent in some pedons.

The IIC horizon has color of 10YR 3/3, 4/4, or 5/3. Moist color is 10YR 3/2, 3/3, 4/3, 4/4, or 5/3. The horizon is sandy loam or sandy clay loam and is 15 to 25 percent clay. Reaction is moderately alkaline or strongly alkaline.

Herito Series

The Herito series consists of very deep, well drained soils on terraces. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Herito series are fine, montmorillonitic, thermic Typic Palexeralfs.

Typical pedon of Herito loam, about 8 miles southwest of the city of Gustine; 1,100 feet south and 700 feet west of the northeast corner of sec. 8, T. 9 S., R. 8 E., Howard Ranch Quadrangle.

A11—0 to 3 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; moderate coarse and very coarse subangular blocky structure; very hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; slightly acid; clear smooth boundary.

A12—3 to 10 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; weak medium and coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; neutral; abrupt smooth boundary.

A2—10 to 12 inches; light brown (7.5YR 6/4) loam, brown (7YR 4/4) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; neutral; clear smooth boundary.

B21t—12 to 16 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; strong medium prismatic structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films on peds and in pores; neutral; clear smooth boundary.

B22t—16 to 28 inches; strong brown (7.5YR 4/6) clay loam, dark brown (7.5YR 3/4) moist; moderate medium prismatic structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films on peds; neutral; clear smooth boundary.

B3tca—28 to 43 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films on peds; strongly effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; gradual wavy boundary.

C—43 to 60 inches; strong brown (7.5YR 5/6) clay loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; hard, very friable, sticky and slightly plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds; moderately alkaline.

Depth of the solum is 35 to 60 inches. The profile is 0 to 10 percent gravel throughout. The content of clay

does not decrease by 20 percent or more from the maximum in the B horizon within 1.5 meters of the surface.

The A horizon has color of 10YR 5/3 or 5/4 or of 7.5YR 5/4 or 6/4. Moist color is 10YR 3/4 or 7.5YR 3/4 or 4/4. The horizon is 18 to 25 percent clay. It is slightly acid or neutral.

The B horizon has color of 10YR 4/6 or 5/6 or of 7.5YR 4/4, 4/6, 5/4, or 5/6. Moist color is 10YR 4/4 or 7.5YR 3/4, 4/4, 4/6, or 5/6. The horizon is clay loam or sandy clay and is 35 to 40 percent clay. It is neutral to moderately alkaline. Some pedons do not have segregated lime in the B3 horizon.

The C horizon has color of 7.5YR 5/6, 5/8, 6/6, or 6/8. Moist color is 7.5YR 3/4, 4/4, 4/6, 5/4, 5/6, or 5/8. The horizon is clay loam or sandy clay loam and is 30 to 35 percent clay. It is mildly alkaline or moderately alkaline.

Honker Series

The Honker series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from sedimentary rock. Slope is 30 to 75 percent.

Soils of the Honker series are fine, mixed, thermic Mollic Palexeralfs.

Typical pedon of Honker sandy loam, 50 to 65 percent slopes, about 14 miles west of the city of Los Banos; 3,600 feet south and 2,100 feet east of the southwest corner of sec. 34, T. 9 S., R. 7 E., Pacheco Pass Quadrangle.

A11—0 to 7 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; 5 percent gravel 2 to 25 millimeters in diameter; 1.9 percent organic matter; 15 percent clay; neutral; abrupt smooth boundary.

A12—7 to 11 inches; light yellowish brown (10YR 6/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine tubular pores; 1 percent organic matter; 26 percent clay; neutral; clear smooth boundary.

A13—11 to 14 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; strong medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular pores; common thin clay films in pores and bridging sand grains; 30 percent clay; neutral; abrupt wavy boundary.

B21t—14 to 21 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 4/6) moist; strong medium prismatic structure; very hard, firm, sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many moderately thick pressure faces; 48 percent clay; neutral; clear smooth boundary.

B22t—21 to 28 inches; reddish yellow (5YR 6/6) clay, yellowish red (5YR 5/6) moist; moderate medium prismatic structure; very hard, firm, sticky and plastic; few very fine and fine roots; no pores; many moderately thick pressure faces; 10 percent angular gravel 2 to 5 millimeters in diameter; 42 percent clay; neutral; clear smooth boundary.

C—28 to 38 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/6) moist; massive; very hard, very firm, slightly sticky and plastic; few very fine roots; few very fine tubular pores; 5 percent angular gravel 2 to 5 millimeters in diameter; 38 percent clay; neutral; abrupt wavy boundary.

R—38 inches; slightly weathered sandstone.

Depth to bedrock is 20 to 40 inches. Depth to an abrupt increase in the content of clay is 4 to 23 inches. Organic matter content is more than 1.1 percent at a depth of 4 inches and is less than 1.1 percent below a depth of 7 inches. In areas where the solum is less than 21 inches thick, it has value of 6 when dry and chroma of 4 or more when moist. In some pedons as much as 5 percent of the surface is covered with cobbles. The B horizon has 15 to 30 percent (absolute) more clay than the A horizon.

The A11 horizon has color of 7.5YR 4/4, 4/6, 5/2, 5/4, or 5/6 or of 10YR 4/3, 4/4, 4/6, 5/3, 5/4, or 5/6. Moist color is 7.5YR 3/2 or 3/4 or 10YR 3/2, 3/3, 3/4, or 3/6. The horizon is 10 to 20 percent clay and 0 to 10 percent gravel and cobbles. Reaction is slightly acid or neutral.

The A12 and A13 horizons have color of 7.5YR 5/4, 5/6, or 6/4 or of 10YR 4/3, 4/4, 5/3, 5/4, 5/6, 6/3, 6/4, or 6/6. Moist color is 7.5YR 3/4, 3/6, 4/4, or 4/6 or 10YR 3/3, 3/4, 3/6, 4/2, 4/3, 4/4, or 4/6. These horizons are sandy clay loam, clay loam, or loam. They are 20 to 35 percent clay and 0 to 5 percent gravel and cobbles. Reaction is slightly acid or neutral.

The B2t horizon has color of 2.5YR 4/6 or 5/6; 5YR 5/4, 5/6, 5/8, 6/4, or 6/6; or 7.5YR 5/4, 5/6, 6/4, or 6/6. Moist color is 2.5YR 4/6; 5YR 4/4, 4/6, 5/6, or 5/8; or

7.5YR 4/4, 4/6, 5/4, 5/6, or 5/8. The horizon is clay, sandy clay, or clay loam. It is 35 to 55 percent clay and 0 to 15 percent angular gravel and cobbles. Reaction is slightly acid to mildly alkaline.

The C horizon has color of 7.5YR 5/4, 6/2, 6/4, 6/6, or 7/4 or of 10YR 5/3, 5/4, 6/3, 6/4, 6/6, 7/3, or 7/4. Moist color is 7.5YR 4/4, 5/4, 5/6, or 6/4 or 10YR 4/3, 4/4, 5/3, 5/4, 5/6, 6/3, or 6/4. The horizon is clay loam, sandy clay, or clay. It is 35 to 45 percent clay and 0 to 15 percent angular gravel and cobbles. Reaction is slightly acid to mildly alkaline.

Hytop Series

The Hytop series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from basic volcanic rock. Slope is 30 to 65 percent.

Soils of the Hytop series are fine, mixed, thermic Typic Palexeralfs.

Typical pedon of a Hytop sandy loam in an area of Altamont Variant-Hytop complex, 30 to 50 percent slopes, about 20 miles west-southwest of the city of Los Banos; 1,150 feet west and 900 feet north of the southeast corner of sec. 27, T. 11 S., R. 7 E., Mariposa Peak Quadrangle.

A11—0 to 5 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots, few very fine tubular pores; 19 percent clay; 2.2 percent organic matter; neutral; clear smooth boundary.

A12—5 to 10 inches; brown (10YR 5/3) sandy clay loam, brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; common very fine and few fine tubular pores; 22 percent clay; neutral; abrupt smooth boundary.

B21t—10 to 17 inches; strong brown (7.5YR 4/6) clay, brown (7.5YR 4/4 and 10YR 4/3) moist; strong medium prismatic structure; extremely hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; many moderately thick clay films on peds; 44 percent clay; neutral; clear smooth boundary.

B22t—17 to 22 inches; brown (7.5YR 5/4) clay, strong brown (7.5YR 5/6) and brown (10YR 4/3) moist; moderate medium prismatic structure; very hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds; 47 percent clay; neutral; clear wavy boundary.

C—22 to 26 inches; brown (7.5YR 5/4) and strong brown (7.5YR 5/6) clay, strong brown (7.5YR 5/6) and reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and very plastic; no roots; common very fine interstitial pores and few very fine tubular pores; 42 percent clay; neutral; abrupt wavy boundary.

Cr—26 to 60 inches; brownish yellow (10YR 6/6), yellowish red (5YR 4/6), and white (N 8/0), strongly weathered basic volcanic rock; strongly effervescent; disseminated lime.

Depth to a paralithic contact is 20 to 40 inches. The profile is 0 to 10 percent gravel and cobbles 2 to 15 centimeters in diameter throughout. The profile is neutral or mildly alkaline above the paralithic contact. Base saturation is more than 75 percent.

The A horizon has color of 7.5YR 5/4 or of 10YR 5/3, 5/4, or 6/3. Moist color is 7.5YR 4/2 or 10YR 4/2, 4/3, 4/4, or 5/4. The A horizon is 15 to 24 percent clay.

The B horizon has color of 7.5YR 4/4, 4/6, 5/4, or 5/6 or of 10YR 5/4 or 5/6. Moist color is 7.5YR 4/4, 4/6, 5/4, 5/6, or 5/8 or 10YR 4/3, 4/4, or 4/6. The horizon is 40 to 50 percent clay; it has 15 percent (absolute) more clay than the A horizon.

The C horizon is clay loam or clay and is 35 to 45 percent clay.

Illito Series

The Illito series consists of very shallow, well drained soils on mountains. These soils formed in material weathered from basic volcanic rock. Slope is 30 to 75 percent.

Soils of the Illito series are loamy-skeletal, mixed, thermic Lithic Argixerolls.

Typical pedon of an Illito extremely stony loam in an area of Quinto-Illito-Rock outcrop complex, 30 to 50 percent slopes, about 20 miles southwest of the city of Los Banos; 1,400 feet south and 600 feet west of the northeast corner of sec. 29, T. 12 S., R. 8 E. (projected section lines from sec. 5, T. 13 S., R. 8 E.), Ruby Canyon Quadrangle.

A1—0 to 5 inches; dark brown (10YR 4/3) extremely stony loam, very dark grayish brown (10YR 3/2) moist; strong medium and coarse angular blocky structure; hard, friable, sticky and plastic; common very fine roots concentrated along vertical faces of peds; common very fine tubular pores; 10 percent

angular gravel 2 to 5 millimeters in diameter and 35 percent stones and cobbles; slightly acid; abrupt smooth boundary.

B2t—5 to 8 inches; dark brown (7.5YR 4/2) very stony clay, dark brown (7.5YR 3/2) moist; strong medium and coarse prismatic structure; very hard, firm, sticky and plastic; few very fine roots concentrated along vertical faces of peds; common very fine tubular pores; many thick clay films on peds and few thin clay films in pores and bridging sand grains; 10 percent angular gravel 2 to 5 millimeters in diameter and 40 percent stones and cobbles; 1.1 percent organic matter; neutral; abrupt wavy boundary.

R—8 inches; hard, unweathered basic volcanic rock.

From 15 to 50 percent of the surface is covered with stones. Depth to a lithic contact is 5 to 10 inches. The mollic epipedon extends into the Bt horizon and is the same thickness as the solum. Organic matter content of the profile is 1 to 2 percent. The profile is slightly acid or neutral throughout. It is 35 to 60 percent rock fragments, including gravel, cobbles, and stones.

The A horizon has color of 7.5YR 5/4 or 10YR 4/3 or 5/3. Moist color is 7/5YR 3/2 or 10YR 2/2 or 3/2. It is 20 to 27 percent clay.

The B2t horizon has color of 7.5YR 4/2, 4/4, or 5/4 when dry and 7.5YR 3/2 when moist. The horizon is very stony clay loam, very stony clay, or very cobbly clay and is 35 to 45 percent clay.

Kesterson Series

The Kesterson series consists of very deep, poorly drained soils in the valley basin. These soils have a high concentration of sodium in the B horizon and a thick layer of lime. They formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Kesterson series are fine-loamy, mixed, thermic Glossic Natraqualfs.

Typical pedon of a Kesterson sandy loam in an area of Kesterson-Edminster complex, about 13 miles north of the city of Los Banos; 2,000 feet east and 1,700 feet south of the northwest corner of sec. 11, T. 8 S., R. 10 E., Stevenson Quadrangle.

A1—0 to 1.5 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) moist; strong very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores; slightly acid; abrupt smooth boundary.

A2—1.5 to 3.0 inches; gray (10YR 6/1) and dark gray (10YR 4/1) loam, gray (N 5/0) and very dark gray (N 3/0) moist; strong fine angular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; few very fine tubular pores; many thin clay films on peds; neutral; abrupt irregular boundary.

B21t—3 to 6 inches; gray (5Y 5/1) clay loam, very dark gray (5Y 3/1) moist; many medium distinct very dark gray (5Y 3/1) mottles, many medium faint black (5Y 2/1) moist; strong medium columnar structure; hard, very firm, slightly sticky and plastic; common very fine and few fine roots; few very fine tubular pores; many moderately thick clay films on peds and in pores; clean sand grains coat columns; slightly effervescent; disseminated lime; exchangeable sodium percentage is 32; strongly alkaline; clear smooth boundary.

B22t—6 to 12 inches; olive gray (5Y 5/2) and dark gray (5Y 4/1) clay loam, olive gray (5Y 4/2) and very dark gray (5Y 3/1) moist; few fine prominent brownish yellow (10YR 6/6) mottles, common fine prominent yellowish brown (10YR 5/8) moist; strong fine and medium prismatic structure; very hard, very firm, slightly sticky and plastic; few very fine roots; few very fine tubular pores; many thick and moderately thick clay films on peds and in pores; clean sand grains coat prisms; slightly effervescent; disseminated lime; exchangeable sodium percentage is 36; strongly alkaline; clear smooth boundary.

B23tca—12 to 26 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) clay loam, grayish brown (2.5Y 5/2) and very dark gray (5Y 3/1) moist; few fine prominent brownish yellow (10YR 6/8) and white (10YR 8/1) mottles, yellowish brown (10YR 5/8) and light gray (10YR 7/2) moist; strong fine and medium prismatic structure; hard, very firm, slightly sticky and plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films on peds and in pores; slightly effervescent; disseminated lime; calcium carbonate equivalent is 8 percent; strongly alkaline; clear irregular boundary.

C1ca—26 to 46 inches; light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) clay loam, dark grayish brown (2.5Y 4/2) and light brownish gray (2.5Y 6/2) moist; common fine prominent brownish yellow (10YR 6/8) mottles, common medium prominent yellowish brown (10YR 5/8) and light gray (10YR 7/2) moist; moderate fine subangular blocky and angular blocky structure; hard, firm, slightly sticky

and plastic; few very fine roots; common moderately thick clay films on peds and in pores; strongly effervescent. lime is disseminated and is segregated as common medium irregular soft masses; exchangeable sodium percentage is 35; calcium carbonate equivalent is 16 percent; strongly alkaline; clear irregular boundary.

C2ca—46 to 60 inches; pale olive (5Y 6/3) loam, grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) moist; common medium prominent yellowish brown (10YR 5/8) and light gray (10YR 7/2) mottles when moist; weak fine subangular blocky structure; hard, firm, slightly sticky and plastic; few very fine roots; few very fine tubular pores; many thin clay films on peds; violently effervescent; lime is disseminated and is segregated as common medium irregular soft masses; 2 percent durinodes; exchangeable sodium percentage is 32; calcium carbonate equivalent is 8 percent; strongly alkaline.

These soils are saturated with stagnant water for at least a few days annually. The depth to the natric horizon is 1.5 to 8.0 inches. The depth to the upper boundary of the calcic horizon is 15 to 33 inches. Some pedons do not have an A1 horizon. The control section averages from 28 to 32 percent clay, but it ranges from 25 to 35 percent clay. Organic matter content is less than 1 percent. In most areas the profile contains a high percentage of mica.

The A1 horizon has color of 10YR 4/1, 4/2, 5/1, or 5/2; N 5/0 or 6/0; or 2.5Y 6/2. Moist color is 10YR 3/1, 3/2, 4/1, or 4/2 or N 3/0, 4/0, or 5/0. The horizon is slightly acid to moderately alkaline. It is sandy loam or loam and is 10 to 20 percent clay.

The A2 horizon has color of 10YR 4/1, 5/1, 6/1, 7/1, or 7/2 or of 2.5Y 5/2 or 6/2. Moist color is 10YR 3/1, 3/2, 4/1, or 5/1; 2.5Y 3/1, 3/2, or 4/2; or N 3/0 or 5/0. Faint mottling is present in some pedons. The horizon is sandy loam or loam and is 10 to 25 percent clay. It is neutral or moderately alkaline and is calcareous in some pedons.

The Bt horizon has color of 10YR 5/2; 5Y 4/1, 5/1, 5/2, or 6/3; 2.5Y 5/2, 6/2, or 7/2; or 5Y 5/2, 6/2, or 7/2. Moist color is 2.5Y 4/2 or 5/2 or 5Y 2/1, 3/1, 3/2, 4/2, 5/2, or 6/1. The horizon is sandy clay loam or clay loam. Typically, the calcium carbonate equivalent is 2 to 8 percent, but it is more than 15 percent in the lower part of the Bt horizon in some pedons. The electrical conductivity is 2 to 6 millimhos per centimeter. The exchangeable sodium percentage is 16 to 60.

The upper part of the C horizon has color of 2.5Y 6/2 or 7/2 or of 5Y 8/1. Moist color is 2.5Y 4/2, 6/2, or 8/4 or 5Y 4/3, 5/2, 6/2, or 7/2. Value is influenced by the content of lime. The upper part of the C horizon is loam, sandy clay loam, or clay loam. The calcium carbonate equivalent typically is 16 to 45 percent. The exchangeable sodium percentage is 15 to 50 percent.

The lower part of the C horizon has color of 10YR 8/2, 2.5Y 8/4, or 5Y 6/3. Moist color is 2.5Y 4/2, 5/2, or 6/2 or 5Y 4/3, 5/2, 7/2, or 7/4. The lower part of the C horizon is stratified fine sandy loam, loam, or clay loam. The calcium carbonate equivalent is 2 to 12 percent. The exchangeable sodium percentage is 5 to 32. Content of durinodes is 0 to 5 percent.

Laveaga Series

The Laveaga series consists of deep, well drained soils on mountains. These soils formed in residuum derived from andesitic flow material and agglomerate. Slope is 30 to 75 percent.

Soils of the Laveaga series are fine, mixed, mesic Typic Argixerolls.

Typical pedon of a Laveaga sandy clay loam in an area of Laveaga-Lecrag complex, 30 to 50 percent slopes, about 21 miles west-southwest of the city of Los Banos; 2,600 feet east and 800 feet south of the northwest corner of sec. 3, T. 12 S., R. 7 E., Mariposa Peak Quadrangle.

A11—0 to 9 inches; dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) sandy clay loam, very dark grayish brown (10YR 3/2) and dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and plastic; few very fine and fine roots; common very fine tubular pores; 2.2 percent organic matter; 23 percent clay; 82 percent base saturation (sum of cations); neutral; clear smooth boundary.

A12—9 to 18 inches; dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) sandy clay loam, very dark grayish brown (10YR 3/2) and dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; few very fine roots and common fine, medium, and coarse roots; common very fine and fine tubular pores; 0.6 percent organic matter; 28 percent clay; 85 percent base saturation (sum of cations); neutral; abrupt irregular boundary.

B21t—18 to 24 inches, strong brown (7.5YR 5/6) sandy clay, brown (7.5YR 4/4) moist; moderate medium

prismatic structure; hard, firm, sticky and very plastic; few very fine roots and common fine, medium, and coarse roots; common very fine and fine tubular pores; many thick clay films on peds; 37 percent clay; 94 percent base saturation (sum of cations); medium acid; clear wavy boundary.

B22t—24 to 27 inches; strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) sandy clay, strong brown (7.5YR 4/6 and 5/6) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots and common fine and medium roots; common very fine tubular pores; common moderately thick clay films on peds; 38 percent clay; medium acid; clear wavy boundary.

B3t—27 to 48 inches; brown (7.5YR 5/4) and strong brown (7.5YR 5/6) sandy loam, brown (7.5YR 4/4) and strong brown (7.5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots and common fine and medium roots; few very fine tubular and interstitial pores; few thin clay films on peds and bridging sand grains; 18 percent clay; medium acid; clear smooth boundary.

Cr—48 to 60 inches; brownish yellow (10YR 6/6) and yellow (10YR 8/6), strongly weathered andesitic flow material that crushes to loam, light yellowish brown (10YR 6/4) moist; slightly acid.

Depth to a paralithic contact is 40 to 60 inches. Typically, the profile is 0 to 5 percent cobbles and stones, but in some pedons the A horizon is as much as 10 percent cobbles and stones. From 3 to 15 percent of the surface is covered with stones. Organic matter content is 1 to 3 percent in the upper 10 inches. Base saturation (sum of cations) of the profile is more than 75 percent, and reaction is medium acid to neutral throughout.

The A horizon has color of 7.5YR 5/2 or 5/4 or of 10YR 3/3, 4/3, 4/4, or 5/3. Moist color is 7.5YR 3/2 or 3/4 or 10YR 3/2, 3/3, or 3/4. The A horizon dominantly is sandy clay loam or clay loam, but it is stony clay loam in the upper part in some pedons. The horizon is 20 to 35 percent clay.

The B2t horizon has color of 7.5YR 5/4, 5/6, or 6/6. Moist color is 7.5YR 4/4, 4/6, or 5/6. The horizon is sandy clay, clay, or clay loam and is 35 to 45 percent clay.

The B3t horizon has color of 5YR 5/4 or of 7.5YR 5/4, 5/6, or 5/8. Moist color is 5YR 4/4 or 4/6 or 7.5YR 4/4 or 4/6. The horizon is sandy loam, loam, or sandy clay loam and is 15 to 28 percent clay.

Lecrag Series

The Lecrag series consists of deep, well drained soils on mountains. These soils formed in material weathered from andesitic flow material and agglomerate. Slope is 30 to 75 percent.

Soils of the Lecrag series are fine, montmorillonitic, mesic Typic Chromoxererts.

Typical pedon of a Lecrag clay in an area of Laveaga-Lecrag complex, 30 to 50 percent slopes, about 21 miles west-southwest of the city of Los Banos; 2,400 feet east and 1,500 feet south of the northwest corner of sec. 3, T. 12 S., R. 7 E., Mariposa Peak Quadrangle.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium angular blocky structure parting to strong medium granular; very hard, very firm, sticky and very plastic; common very fine and few coarse roots; few very fine and fine tubular pores; common thick pressure faces; 1.4 percent organic matter; neutral; clear wavy boundary.

A12—4 to 15 inches; very dark grayish brown (10YR 3/2, dry or moist) clay; strong coarse and very coarse prismatic structure; very hard, very firm, sticky and very plastic; common very fine and fine roots and few medium and coarse roots; few very fine and fine tubular pores; many thick pressure faces; few intersecting slickensides and sphenoids; 1.1 percent organic matter; slightly acid; clear smooth boundary.

A13—15 to 26 inches; very dark grayish brown (10YR 3/2) clay, dark brown (10YR 3/3) moist; moderate medium and coarse prismatic structure; very hard, very firm, sticky and very plastic; few very fine roots and common fine, medium, and coarse roots; few very fine and fine tubular pores; many thick pressure faces; 0.3 percent organic matter; slightly acid; clear wavy boundary.

AC—26 to 35 inches; brown (7.5YR 5/4) and very dark grayish brown (10YR 3/2) sandy clay, yellowish brown (10YR 5/6) and dark brown (10YR 3/3) moist; weak medium angular blocky and prismatic structure; very hard, firm, sticky and plastic; common fine and few medium roots; few very fine and fine tubular pores; slightly acid; clear wavy boundary.

C—35 to 46 inches; strong brown (7.5YR 5/6) sandy clay loam, yellowish brown (10YR 5/6) and brown (7.5YR 5/4) moist; massive; hard, firm, sticky and

plastic; few fine and medium roots; few very fine and fine tubular pores; slightly acid; gradual wavy boundary.

Cr—46 to 60 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4), strongly weathered andesitic flow material that crushes to sandy clay loam; slightly acid

Depth to a paralithic contact is 40 to 60 inches. Cracks 1 to 2 centimeters wide extend to a depth of 20 to 40 inches when the soil is dry. The cracks are 2.5 to 8.0 centimeters wide at the surface. The profile is medium acid to neutral throughout.

The A horizon has color of 10YR 3/2, 3/3, 4/2, or 4/3. Moist color is 10YR 2/2, 3/2, or 3/3. The horizon is 40 to 55 percent clay.

The C horizon has color of 7.5YR 5/4 or 5/6 or of 10YR 5/4, 5/6, or 6/4. Moist color is 7.5YR 4/4 or 5/4 or 10YR 4/4, 4/6, 5/4, or 5/6. The horizon is 20 to 35 percent clay and as much as 10 percent gravel.

Los Banos Series

The Los Banos series consists of very deep, well drained soils on terraces. These soils formed in calcareous, gravelly alluvium derived from various kinds of rock. Slope is 0 to 15 percent.

Soils of the Los Banos series are fine, mixed, thermic Typic Haploxeralfs.

Typical pedon of Los Banos clay loam, 2 to 8 percent slopes, about 8 miles southwest of the city of Los Banos; 1,700 feet south and 750 feet west of the northeast corner of sec. 14, T. 11 S., R. 9 E., Ortigalita Peak Northwest Quadrangle.

A1—0 to 9 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; hard, friable, very sticky and plastic; common very fine roots; few very fine and fine tubular pores; 1.4 percent organic matter; 36 percent clay; mildly alkaline; gradual smooth boundary.

B1t—9 to 15 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure and weak medium prismatic structure; hard, friable, very sticky and very plastic; common very fine roots; common very fine and few fine tubular pores; few thin clay films on peds; 46 percent clay; slightly effervescent; disseminated lime; calcium carbonate equivalent is 9 percent, moderately alkaline; clear smooth boundary.

B21tca—15 to 25 inches; strong brown (7.5YR 5/6) clay, strong brown (7.5YR 4/6) moist; strong medium subangular blocky structure; very hard, friable, very sticky and very plastic; common very fine roots; common very fine tubular pores; few thin clay films on peds and in pores; 50 percent clay; strongly effervescent; lime is disseminated and is segregated as few irregular soft masses; calcium carbonate equivalent is 17 percent; moderately alkaline; clear smooth boundary.

B22tca—25 to 38 inches; strong brown (7.5YR 5/6) clay, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; very hard, friable, sticky and very plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films on peds and in pores; 48 percent clay; strongly effervescent; lime is disseminated and is segregated as many fine and medium soft masses; calcium carbonate equivalent is 24 percent; moderately alkaline, clear wavy boundary.

B3tca—38 to 55 inches; yellowish red (5YR 5/8) clay, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds and in pores and many thick pressure faces on peds; 46 percent clay; strongly effervescent; lime is disseminated and is segregated as common fine and medium soft masses; calcium carbonate equivalent is 23 percent; moderately alkaline; abrupt wavy boundary.

C—55 to 63 inches; reddish yellow (5YR 6/8) cobbly clay loam, yellowish red (5YR 4/6) moist; massive; weakly cemented; hard, friable, sticky and plastic; no roots; common very fine tubular pores; 37 percent clay; 15 percent cobbles 3 to 8 inches long and 10 percent gravel 2 to 75 millimeters in diameter; strongly effervescent; disseminated lime; calcium carbonate equivalent is 23 percent; moderately alkaline.

The thickness of the solum is 40 to 62 inches. The average clay content of the A horizon is 27 to 40 percent. The average clay content of the B horizon is 35 to 55 percent, but it is at least 8 percent (absolute) more than that of the A horizon. The organic matter content of the A horizon is 0.5 to 1.5 percent. The calcium carbonate equivalent in the solum is 5 to 30 percent, and it is less than 5 percent that of the C horizon or the parent material.

The A horizon has color of 10YR 5/3 or of 7.5YR 4/4

or 5/4. Moist color is 10YR 4/3 or 7.5YR 3/4 or 4/4. The horizon is as much as 10 percent gravel in some pedons. It is effervescent in some pedons. It is mildly alkaline or moderately alkaline.

The B1t horizon has color of 10YR 5/3 or of 7.5YR 4/4 or 5/4. Moist color is 10YR 4/3 or 7.5YR 3/4 or 4/4. The horizon is clay loam or clay and is as much as 5 percent cobbles or gravel in some pedons. It is mildly alkaline or moderately alkaline.

The B2tca horizon has color of 10YR 5/6 or of 7.5YR 5/6 or 5/8. Moist color is 10YR 5/4; 7.5YR 4/4, 4/6, or 5/6; or 5Y 5/6. The horizon is clay loam or clay and is as much as 5 percent cobbles or gravel in some pedons.

The B3tca horizon has color of 7.5YR 5/6 or 5/8 or of 5YR 4/8 or 5/8. Moist color is 7.5YR 4/6 or 5YR 3/6 or 4/6. The horizon is clay loam or clay and is as much as 15 percent cobbles or gravel. Some pedons do not have a B3tca horizon.

The C horizon has color of 7.5YR 6/8 or 5YR 6/8. Moist color is 7.5YR 4/6 or 5YR 4/6. The fine earth fraction is sandy clay loam or clay loam, and it is cobbly, gravelly, very cobbly, or very gravelly. The C horizon is 25 to 60 percent cobbles and gravel and 25 to 40 percent clay.

Los Banos Variant

The Los Banos Variant consists of very deep, well drained soils on low terraces. These soils formed in mixed gravelly alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Los Banos Variant are fine-loamy, mixed, thermic Typic Argixerolls.

Typical pedon of Los Banos Variant gravelly sandy clay loam, about 3.3 miles north of the community of Santa Nella; 2,100 feet north and 1,700 feet west of the southeast corner of sec. 18, T. 9 S., R. 9 E., Howard Ranch Quadrangle.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; few very fine tubular pores; 26 percent clay; 20 percent gravel 2 to 25 millimeters in diameter; neutral; clear smooth boundary.

A3—9 to 16 inches; brown (10YR 5/3) gravelly sandy clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine tubular pores; 30 percent clay; 15 percent gravel 2 to 13 millimeters in diameter; neutral; clear wavy boundary.

B21t—16 to 23 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 3/4) moist; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; 35 percent clay; 15 percent gravel 5 to 20 millimeters in diameter; few thick and common moderately thick clay films bridging sand grains; neutral; clear wavy boundary.

B22t—23 to 30 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate coarse subangular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; 31 percent clay; 25 percent gravel 2 to 40 millimeters in diameter; many thin, moderately thick, and thick clay films bridging sand grains; neutral; gradual smooth boundary.

B3t—30 to 37 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; few very fine tubular and interstitial pores; 21 percent clay; 25 percent gravel 2 to 40 millimeters in diameter; many thick and few moderately thick clay films bridging sand grains; mildly alkaline; clear smooth boundary.

IIC1—37 to 60 inches; strong brown (7.5YR 5/6) extremely gravelly coarse sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine tubular and interstitial pores; 16 percent clay; 65 percent gravel 2 to 40 millimeters in diameter; common thin clay films bridging sand grains; mildly alkaline; clear smooth boundary.

IIC2—60 to 65 inches; light yellowish brown (10YR 6/4) extremely gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; no roots; few very fine tubular and interstitial pores; 65 percent gravel 2 to 13 millimeters in diameter; common thin clay films bridging sand grains; mildly alkaline.

Depth to the solum is 30 to 45 inches. The solum is 15 to 35 percent gravel, and the C horizon is 60 to 75 percent gravel.

The A horizon has color of 10YR 4/2, 4/3, or 5/3. Moist color is 10YR 3/2 or 3/3. The horizon is 20 to 30 percent clay. Organic matter content is 1 to 2 percent.

The B2t horizon has color of 7.5YR 5/4 or 5/6. Moist color is 7.5YR 3/4, 4/4, or 4/6. The horizon is gravelly clay loam or gravelly sandy clay loam. It is 25 to 40 percent clay but averages less than 35 percent.

The C horizon has color of 10YR 5/4, 5/6, or 6/6 or of 7.5YR 5/6, 6/4, or 6/6. Moist color is 10YR 4/4 or 4/6 or 7.5YR 3/4, 4/4, or 4/6. The horizon is very gravelly or extremely gravelly coarse sandy loam or very gravelly or extremely gravelly sandy loam. It is 10 to 20 percent clay.

Marcuse Series

The Marcuse series consists of very deep, poorly drained soils on the valley basin rim. These soils formed in mixed alluvium derived dominantly from sedimentary rock. The soils develop wide cracks and have a high concentration of sodium. Slope is 0 to 2 percent.

Soils of the Marcuse series are fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Typical pedon of Marcuse clay, leveled, about 7 miles north of the city of Los Banos; 2,100 feet east and 250 feet south of the northwest corner of sec. 13, T. 9 S., R. 10 E., San Luis Ranch Quadrangle.

A11—0 to 5 inches; gray (5Y 5/1) clay, dark olive gray (5Y 3/2) moist; moderate medium platy structure; very hard, firm, very sticky and very plastic; common very fine and few fine roots; few very fine tubular pores, common fine gypsum masses; electrical conductivity is 15 millimhos per centimeter; exchangeable sodium percentage is 23; moderately alkaline; clear smooth boundary.

A12—5 to 11 inches; gray (5Y 5/1) clay, dark olive gray (5Y 3/2) moist; moderate medium prismatic structure; very hard, firm, very sticky and very plastic; few very fine and fine roots; few very fine tubular pores; many moderately thick pressure faces; common fine gypsum masses; electrical conductivity is 15 millimhos per centimeter; exchangeable sodium percentage is 26; moderately alkaline; clear smooth boundary.

B2ca—11 to 18 inches; olive gray (5Y 5/2) clay, dark gray (5Y 4/1) moist; moderate medium prismatic structure; very hard, firm, very sticky and very plastic; few fine roots; few very fine tubular pores; many moderately thick pressure faces; strongly effervescent; lime is disseminated and is segregated as common fine and medium soft masses; electrical conductivity is 16 millimhos per centimeter; exchangeable sodium percentage is 26; moderately alkaline; clear smooth boundary.

C1—18 to 36 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; weak medium prismatic structure; very hard, firm, very sticky and very plastic; few fine roots; few very fine tubular pores; many moderately thick pressure faces; slightly effervescent; disseminated lime; electrical conductivity is 9 millimhos per centimeter; exchangeable sodium percentage is 39; moderately alkaline; clear smooth boundary.

C2—36 to 49 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; few fine prominent dark greenish gray (5GY 4/1) mottles when moist; massive; very hard, firm, very sticky and very plastic; no roots; no pores; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

C3—49 to 60 inches; olive gray (5Y 5/2) clay loam, olive gray (5Y 4/2) moist; massive; very hard, firm, very sticky and very plastic; no pores; moderately alkaline.

A seasonal high water table is at a depth of 12 to 36 inches in November through April; however, many areas become inundated with water from ponded areas and from stream overflow. Cracks 1 centimeter wide extend to a depth of 20 to 25 inches when the soil is dry.

The A horizon has color of 10YR 4/2, 6/3, 7/2, or 7/4; 2.5Y 6/2, 6/4, 7/2, or 7/4; or 5Y 5/1, 6/1, 6/4, or 7/2. Moist color is 10YR 2/1, 4/2, 4/3, 5/2, or 5/6; 2.5Y 4/2, 4/4, 5/2, or 5/4; or 5Y 3/2, 4/1, 4/3, or 5/1. Mottles when moist are few, fine, and distinct and have color of 7.5YR 4/4 or 10YR 4/6. The horizon is clay or silty clay and is 40 to 50 percent clay. The electrical conductivity is 8 to 16 millimhos per centimeter, and the exchangeable sodium percentage is 15 to 30.

The B horizon has color of 10YR 5/6, 6/2, 6/3, 6/4, 7/3, or 7/4; 2.5Y 6/3 or 6/4; or 5Y 5/2. Moist color is 10YR 3/4, 4/1, 4/3, 5/2, 5/4; 2.5Y 6/3 or 6/4; or 5Y 4/1. Mottles when moist are few, fine, and distinct and have color of 7.5YR 4/4 or are many, fine, and prominent and have color of 7.5YR 3/4, 5Y 4/2 or 6/1, or 5G 5/1. The horizon is 40 to 60 percent clay. It is noneffervescent to strongly effervescent. The electrical conductivity is 8 to 16 millimhos per centimeter, and the exchangeable sodium percentage is 15 to 30.

The C horizon has color of 10YR 6/3, 6/4, 7/3, or 7/6; 2.5Y 6/4 or 7/6; or 5Y 5/2, 6/2, or 7/3. Moist color is 10YR 4/4, 5/3, or 5/4; 2.5Y 4/4, 5/2, 6/4, or 7/2; or 5Y 4/1, 4/2, or 6/2. Mottles when moist are few, fine, and prominent and have color of 7.5YR 3/2 or 5/6; 10YR 3/2, 5/6, or 6/6; 2.5Y 3/2; 5Y 4/1 or 5/1; 5GY 4/1 or 5/1; 5G 4/1; 5BG 4/1 or 5/1; 5B 5/1; or N 2/0. The horizon is

clay loam or clay and is 35 to 60 percent clay. It is noneffervescent to strongly effervescent. The electrical conductivity is more than 8 millimhos per centimeter, and the exchangeable sodium percentage is 15 to 40.

Millsholm Series

The Millsholm series consists of shallow, well drained soils on mountains. These soils formed in material weathered from sandstone or shale. Slope is 8 to 75 percent.

Soils of the Millsholm series are loamy, mixed, thermic Lithic Xerochrepts.

Typical pedon of a Millsholm loam in an area of Millsholm-Rock outcrop complex, 15 to 30 percent slopes, about 19 miles west of the city of Los Banos; 2,400 feet west and 2,000 feet north of the southeast corner of sec. 27, T. 10 S., R. 7 E., Pacheco Pass Quadrangle.

A1—0 to 6 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, friable, sticky and plastic; few very fine and fine roots; common very fine tubular pores; 5 percent gravel 2 to 5 millimeters in diameter; medium acid; clear smooth boundary.

B21t—6 to 12 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; common very fine tubular pores; very few very thin clay films on peds; 10 percent gravel 2 to 5 millimeters in diameter; medium acid; clear smooth boundary.

B22t—12 to 19 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; very few thin clay films on peds; 10 percent angular gravel 25 to 50 millimeters in diameter; medium acid; abrupt wavy boundary.

R—19 inches; unweathered, fractured sandstone.

Thickness of the solum and depth to bedrock are 10 to 20 inches. The profile is 0 to 15 percent gravel. In some pedons as much as 5 inches of the bedrock is shattered and fragmented, and soil material is in the cracks. The profile is medium acid to neutral throughout. It is 20 to 27 percent clay.

The A horizon has color of 10YR 5/3, 5/4, 6/3, 6/4, or 7/4. Moist color is 10YR 4/3 or 4/4.

The B horizon has color of 7.5YR 4/3, 4/4, or 6/4 or of 10YR 5/3, 5/4, or 6/4. Moist color is 7.5YR 4/4 or 10YR 4/3, 4/4, or 5/4.

Mollic Xerofluvents

The Mollic Xerofluvents consist of very shallow to deep, somewhat poorly drained to excessively drained soils on flood plains of mountain and foothill streams. These soils formed in stratified gravelly alluvium derived from various kinds of rock. Slope is 0 to 2 percent.

Reference pedon of Mollic Xerofluvents, channeled, about 13 miles southwest of the city of Los Banos; 1,700 feet south and 1,500 feet west of the northeast corner of sec. 23, T. 11 S., R. 8 E. (projected section lines from sec. 19, T. 11 S., R. 9 E.), Los Banos Valley Quadrangle.

A—0 to 24 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; massive; hard, very friable, nonsticky and nonplastic; common very fine roots; few very fine, fine, and medium pores; moderately alkaline; abrupt wavy boundary.

IIC—24 to 60 inches; extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 30 percent cobbles and 60 percent gravel.

Depth to the C horizon is 6 to 50 inches. The profile is neutral to moderately alkaline. The water table generally is at a depth of 36 to 60 inches during part of the year, but it is at a depth of more than 60 inches in some areas. Organic matter content is more than 1 percent in the upper 4 inches.

The A horizon has color of 7.5YR 4/2, 4/4, or 5/2 or of 10YR 4/3, 4/4, 5/2, 5/3, or 5/4. Moist color is 7.5YR 3/2 or 3/4 or 10YR 3/2, 3/3, or 3/4. The horizon is loamy sand, sandy loam, fine sandy loam, or loam and is 0 to 15 percent gravel.

The C horizon is extremely gravelly or extremely cobbly. The fine earth fraction is loamy sand or coarser textured material.

Oneil Series

The Oneil series consists of moderately deep, well drained soils on foothills. These soils formed in material weathered from calcareous sandstone and shale. Slope is 8 to 50 percent.

Soils of the Oneil series are fine-silty, mixed, thermic Calcic Haploxerolls.

Typical pedon of Oneil silt loam, 30 to 50 percent slopes, about 12 miles west-southwest of the city of Los Banos; 2,400 feet west and 250 feet north of the

southeast corner of sec. 2, T. 11 S., R. 8 E. (projected section lines from sec. 6, T. 11 S., R. 9 E.), Los Banos Valley Quadrangle.

A11—0 to 3 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as few fine irregular hard masses; 3 percent organic matter; moderately alkaline; clear smooth boundary.

A12—3 to 6 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine tubular pores; slightly effervescent; disseminated lime; 1.6 percent organic matter; moderately alkaline; clear smooth boundary.

A13—6 to 13 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium and coarse angular blocky structure; hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; strongly effervescent; disseminated lime; 1 percent organic matter; moderately alkaline; clear smooth boundary.

ACca—13 to 21 inches; brown (10YR 5/3) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; few very fine tubular pores; strongly effervescent; lime is disseminated and is segregated as common fine threads; 0.8 percent organic matter; moderately alkaline; clear smooth boundary.

Cca—21 to 29 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 6 percent gravel; strongly effervescent; lime is disseminated and is segregated as common fine threads; 14 percent calcium carbonate equivalent; moderately alkaline; abrupt wavy boundary.

R—29 inches; unweathered, calcareous sandstone and shale.

Depth to a lithic contact is 20 to 40 inches. From 25 to 50 percent of the original surface has been lost through erosion.

The A horizon has color of 10YR 3/3, 4/3, 4/4, or 5/3. Moist color is 10YR 3/2 or 3/3. Clay content is 20 to 27 percent, and silt content is 60 to 70 percent. Organic matter content is 1 to 3 percent. The horizon is slightly effervescent to strongly effervescent.

The C horizon has color of 10YR 5/4, 5/6, or 6/4. Moist color is 10YR 3/3, 3/4, 4/3, 4/4, or 5/4. The horizon is silt loam or silty clay loam. Clay content is 20 to 35 percent, and silt content is 50 to 70 percent. Calcium carbonate equivalent is 5 to 14 percent. Gravel content is 5 to 10 percent.

Oquin Series

The Oquin series consists of moderately deep, well drained soils on low foothills. These soils formed in material weathered from calcareous sandstone. Slope is 2 to 30 percent.

Soils of the Oquin series are coarse-loamy, mixed, thermic Calcic Haploxerolls.

Typical pedon of Oquin fine sandy loam, 15 to 30 percent slopes, about 6 miles west-southwest of the city of Gustine; 600 feet east and 550 feet north of the southwest corner of sec. 21, T. 8 S., R. 9 E., Howard Ranch Quadrangle.

A11—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine roots; few very fine tubular pores and common very fine interstitial pores; slightly effervescent; lime is disseminated and is segregated as few fine soft masses and concretions; moderately alkaline; clear smooth boundary.

A12—8 to 14 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine tubular pores and common very fine interstitial pores; slightly effervescent; lime is disseminated and is segregated as few fine soft masses and concretions; moderately alkaline; clear wavy boundary.

A13ca—14 to 24 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores and common very fine interstitial pores; strongly effervescent; lime is disseminated and is segregated as few fine soft masses and

concretions; moderately alkaline; clear smooth boundary.

Cca—24 to 31 inches; light brownish gray (10YR 6/2) sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few very fine tubular and interstitial pores; strongly effervescent; lime is disseminated and is segregated as common fine soft masses and concretions; moderately alkaline; abrupt wavy boundary.

Cr—31 inches; strongly weathered, calcareous sandstone.

Depth to a paralithic contact is 20 to 40 inches. The profile is mildly alkaline or moderately alkaline throughout In most pedons segregated lime occurs as soft masses, filaments, or concretions throughout the profile. The A horizon is 15 to 26 inches thick. Organic matter content generally is 1 to 3 percent in the A horizon, but it is less than 1 percent below a depth of 20 inches in areas where the horizon is more than 20 inches thick. The profile is 12 to 18 percent clay throughout.

The A horizon has color of 10YR 3/2, 3/3, 4/2, 4/3, 5/2, or 5/3. Moist color is 10YR 2/2, 3/2, or 3/3. The lower part of the A horizon is fine sandy loam, sandy loam, or loam. The A horizon is slightly effervescent or strongly effervescent.

The C horizon has color of 10YR 4/3, 5/3, 5/4, 6/2, or 6/3 Moist color is 10YR 3/3, 3/4, 4/3, or 4/4. The horizon is sandy loam, fine sandy loam, or loam. It is strongly effervescent or violently effervescent.

Orognen Series

The Orognen series consists of very deep, well drained soils on dissected terraces at high elevations. These soils formed in mixed alluvium derived dominantly from sedimentary or metamorphic rock. Slope is 2 to 50 percent.

Soils of the Orognen series are fine, mixed, thermic Typic Palexeralfs.

Typical pedon of Orognen sandy loam, 2 to 5 percent slopes, about 20 miles southwest of the city of Los Banos; 2,600 feet south and 300 feet east of the northwest corner of sec. 12, T. 13 S., R. 8 E., Ruby Canyon Quadrangle.

A11—0 to 2 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak medium and thick platy structure and weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; slightly acid; clear smooth boundary.

A12—2 to 11 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

A13—11 to 16 inches; light brown (7.5YR 6/4) sandy loam, yellowish red (5YR 4/6) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

B1t—16 to 19 inches; reddish brown (5YR 4/4) sandy clay loam, yellowish red (5YR 4/6) moist; strong medium and coarse prismatic structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; few very fine tubular pores; common thin and few moderately thick clay films on peds and bridging sand grains; neutral; abrupt smooth boundary.

B2t—19 to 34 inches; reddish brown (5YR 4/4) clay, yellowish red (5YR 4/6) and reddish yellow (7.5YR 6/6) moist; strong medium, coarse, and very coarse prismatic structure; hard, very firm, sticky and very plastic; few very fine and fine roots; few very fine tubular pores; continuous thick clay films on peds and bridging sand grains; moderately alkaline; clear smooth boundary.

B31t—34 to 52 inches; yellowish red (5YR 4/6) gravelly clay loam, yellowish red (5YR 4/6) and brown (7.5YR 4/4) moist; massive; slightly hard, firm, sticky and plastic; no roots; few very fine tubular pores; common moderately thick clay films bridging sand grains; 25 percent gravel 2 to 5 millimeters in diameter; moderately alkaline; gradual smooth boundary.

B32t—52 to 62 inches; yellowish red (5YR 4/6) gravelly clay loam, yellowish red (5YR 4/6 and 5/8) moist; massive; slightly hard, firm, sticky and plastic; few very fine tubular pores; common thin and moderately thick clay films bridging sand grains; 25 percent gravel 2 to 5 millimeters in diameter; moderately alkaline.

The solum is 40 to 60 inches thick or more.

The A horizon has color of 7.5YR 5/4, 6/4, or 7/4 or of 10YR 5/3 or 6/4. Moist color is 5YR 4/6; 7.5YR 3/4, 4/4, or 5/4; or 10YR 3/2, 3/3, or 4/4. Organic matter content is less than 1 percent. The A horizon is sandy

loam in the upper part and is sandy loam, loam, sandy clay loam, or gravelly sandy clay loam in the lower part. It is 10 to 25 percent clay and 0 to 20 percent gravel. Reaction is slightly acid to mildly alkaline in the upper part and is neutral or mildly alkaline in the lower part.

The B1t horizon has color of 5YR 4/4 or 4/6 or of 7.5YR 4/4, 4/6, or 5/4. Moist color is 5YR 4/4 or 4/6 or 7.5YR 4/4. The horizon is gravelly sandy clay loam, sandy clay loam, or loam. It is 15 to 25 percent clay and 0 to 20 percent gravel. Reaction is neutral or mildly alkaline. Some pedons do not have a B1t horizon.

The B2t horizon has color of 5YR 4/4 or 4/6 or of 7.5YR 4/4 or 4/6. Moist color is 5YR 4/4 or 4/6 or 7.5YR 4/4, 5/4, or 6/6. The horizon is clay loam, sandy clay, or clay. It is 35 to 60 percent clay and has at least 15 percent more clay (absolute) than the B1t horizon. The horizon is 0 to 10 percent gravel. Reaction is neutral to moderately alkaline.

The B3t horizon has color of 5YR 4/6 or 5/4 or of 7.5YR 4/6 or 5/4. Moist color is 5YR 4/6 or 5/8 or 7.5YR 4/4, 4/6, 5/4, or 5/6. The horizon is gravelly sandy clay loam, gravelly clay loam, or clay loam. It is 30 to 40 percent clay and 10 to 35 percent gravel. Reaction is mildly alkaline or moderately alkaline.

Palazzo Series

The Palazzo series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Palazzo series are fine-loamy, mixed, thermic Fluvaquentic Haplaquolls.

Typical pedon of Palazzo sandy loam, partially drained, about 8 miles north of the city of Dos Palos; 800 feet east and 500 feet north of the southwest corner of sec. 31, T. 9 S., R. 13 E., Santa Rita Bridge Quadrangle.

Ap—0 to 14 inches; very dark gray (10YR 3/1) sandy loam, black (10YR 2/1) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine tubular and interstitial pores; moderately alkaline; abrupt wavy boundary.

B2—14 to 26 inches; grayish brown (2.5Y 5/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct strong brown (7.5YR 5/6) mottles when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular and interstitial pores; moderately alkaline; abrupt wavy boundary.

IIC1g—26 to 41 inches; dark gray (10YR 4/1) clay loam, black (N 2/0) and light olive brown (2.5Y 5/4) moist; strong medium and coarse prismatic structure parting to strong fine and medium angular blocky; hard, friable, sticky and plastic; few very fine roots; common very fine, many fine, and few medium tubular pores; common thin clay films on peds and in pores; moderately alkaline; gradual smooth boundary.

IIC2g—41 to 60 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (2.5Y 3/2) and light yellowish brown (2.5Y 6/4) moist; massive; hard, friable, sticky and plastic; no roots; common very fine, many fine, and few medium tubular pores; common thin clay films in pores and bridging sand grains; moderately alkaline.

These soils are saturated with stagnant water for at least a few days annually. Some areas are artificially drained. Thickness of the mollic epipedon is 10 to 23 inches. The 10- to 40-inch control section averages 18 to 35 percent clay. Organic matter content is 1 to 3 percent in the A horizon, and it decreases irregularly with increasing depth. The profile is mildly alkaline or moderately alkaline.

The A horizon has color of 10YR 3/1, 3/2, 4/1, 4/2, or 5/1; 2.5Y 3/2 or 4/2; or N 4/0 or 5/0. Moist color is 10YR 2/1, 2/2, 3/1, or 3/2 or 2.5Y 3/2. The A horizon is 10 to 18 percent clay.

The B horizon has color of 10YR 5/2, 5/3, 6/2, 6/3, 7/2, or 7/3 or of 2.5Y 5/2, 6/2, or 7/2. Moist color is 10YR 4/2, 5/3, 6/1, or 6/3; 2.5Y 4/2, 4/4, or 5/2; or 5Y 4/3. The horizon is sandy loam or loam and is 5 to 18 percent clay.

Some pedons have a C horizon that is black clay loam or silt loam and is 0.5 inch thick.

The upper part of the IIC horizon has color of 10YR 3/1 or 4/1; 5Y 3/1 or 4/1; or N 3/0. Moist color is 10YR 2/1, 3/1, or 4/2; 2.5Y 3/2, 4/2, 5/2, or 5/4; 5Y 2/1, 3/1, 3/2, or 4/3; or N 2/0. Some pedons have mottles, and some are calcareous. The lower part of the IIC horizon has color of 10YR 5/2, 5/3, 6/2, or 6/3; 2.5Y 5/2 or 6/2; or 5Y 5/2, 5/3, 6/2, or 6/3. Moist color is 10YR 3/2; 2.5Y 3/2, 4/2, 5/4, 6/2, or 6/4; or 5Y 4/1, 4/3, 4/4, or 5/3. The IIC horizon is clay loam or silt loam and is 20 to 35 percent clay.

Paver Series

The Paver series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed

alluvium derived dominantly from sedimentary rock. Slope is 0 to 5 percent.

Soils of the Paver series are fine-loamy, mixed, nonacid, thermic Xeric Torriorthents.

Typical pedon of Paver clay loam, 0 to 2 percent slopes, about 13 miles south-southeast of the city of Los Banos; 1,400 feet east and 800 feet north of the southwest corner of sec. 16, T. 12 S., R. 11 E., Charleston School Quadrangle.

Ap—0 to 5 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; hard, friable, very sticky and very plast'c; common very fine roots; few very fine tubular pores; electrical conductivity is 1.3 millimhos per centimeter; exchangeable sodium percentage is 4; slightly acid (as a result of the addition of sulfur amendments); abrupt smooth boundary.

A12—5 to 16 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, friable, very sticky and very plastic; common very fine, fine, medium, and coarse roots; few very fine tubular pores; 0.7 percent organic matter; neutral; clear smooth boundary.

C1—16 to 22 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; moderate medium subangular blocky structure; hard, friable, very sticky and very plastic; common very fine, fine, and medium roots; few very fine and fine tubular pores; common moderately thick pressure faces; moderately alkaline; diffuse wavy boundary.

C2ca—22 to 39 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, very sticky and plastic; common very fine, fine, medium, and coarse roots; common very fine tubular pores; strongly effervescent; lime is disseminated and is segregated as common fine filaments; electrical conductivity is 2.3 millimhos per centimeter; exchangeable sodium percentage is 2; 9 percent calcium carbonate equivalent; moderately alkaline; diffuse wavy boundary.

C3ca—39 to 50 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots and common fine and medium roots; common very fine tubular pores; strongly effervescent; lime is disseminated and is segregated as few fine filaments; 8 percent calcium carbonate equivalent; moderately alkaline; clear wavy boundary.

C4—50 to 68 inches; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, and medium roots; common very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as few fine filaments; moderately alkaline; clear wavy boundary.

C5—60 to 76 inches; light yellowish brown (2.5Y 6/4) clay loam stratified with coarse sandy loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; no roots; few very fine tubular pores; slightly effervescent; disseminated lime; electrical conductivity is 3.4 millimhos per centimeter; exchangeable sodium percentage is 8; moderately alkaline.

Organic matter content in the upper 60 inches is 0.1 to 0.8 percent, and it decreases regularly with increasing depth. The electrical conductivity below a depth of 16 inches is 2 to 4 millimhos per centimeter, and it increases with increasing depth. Depth to lime is 20 to 30 inches. Some pedons are as much as 10 percent gravel.

The A horizon has color of 10YR 4/3, 5/2, 5/3, 5/4, or 6/3. Moist color is 10YR 3/3, 4/3, or 5/3. The horizon is 27 to 35 percent clay. Reaction is slightly acid to mildly alkaline. The exchangeable sodium percentage is 1 to 5.

The C horizon has color of 10YR 5/3, 5/4, 6/3, 6/4, or 6/6 or of 2.5Y 5/4, 6/4, or 7/6. Moist color is 10YR 3/3, 4/3, 4/4, 5/3, 5/4, or 5/6 or 2.5Y 4/4, 5/4, 5/6, or 6/6. The horizon is loam or clay loam and is 23 to 35 percent clay. It is slightly effervescent to strongly effervescent. The exchangeable sodium percentage is 2 to 8.

Peckham Series

The Peckham series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from volcanic tuff conglomerate. Slope is 2 to 50 percent.

Soils of the Peckham series are loamy-skeletal, mixed, thermic Typic Haploxeralfs.

Typical pedon of Peckham cobbly loam, 2 to 5 percent slopes, about 20 miles southwest of the city of Los Banos; 3,000 feet east and 2,600 feet north of the southeast corner of sec. 13, T. 12 S., R. 7 E., Mariposa Peak Quadrangle.

A11—0 to 2 inches; brown (7.5YR 5/4) cobbly loam,

dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; common very fine tubular pores; 10 percent cobbles and 5 percent stones; 1.4 percent organic matter; 12 percent clay; medium acid; clear smooth boundary.

A12—2 to 13 inches; brown (7.5YR 5/4) cobbly loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; common very fine and fine tubular pores; 10 percent cobbles and 5 percent stones; 0.9 percent organic matter; 16 percent clay; slightly acid; clear smooth boundary.

B21t—13 to 20 inches; strong brown (7.5YR 4/6) very cobbly loam, dark reddish brown (5YR 3/3) moist; common fine and medium subangular blocky structure; slightly hard, friable, very sticky and plastic; few very fine roots; few fine and coarse and common medium tubular pores; common moderately thick clay films in pores; common thin clay films bridging sand grains and few thin clay films on peds; 35 percent cobbles and 15 percent stones; 0.5 percent organic matter; 24 percent clay; slightly acid; abrupt smooth boundary.

IIB22t—20 to 24 inches; strong brown (7.5YR 4/6) extremely cobbly clay, dark brown (7.5YR 3/4) moist; massive; hard, firm, sticky and very plastic; few medium and coarse roots; few very fine and fine tubular pores; many thick clay films in pores and bridging sand grains; 30 percent gravel, 25 percent cobbles, and 15 percent stones; 51 percent clay; slightly acid; abrupt smooth boundary.

R—24 inches; hard, fractured volcanic tuff conglomerate.

Depth to volcanic tuff conglomerate is 20 to 30 inches. Cobbles and stones typically cover 5 to 20 percent of the surface, but in some areas the cobbles and stones have been removed mechanically. Organic matter content is as much as 2 percent in the A horizon, but it is less than 1 percent within 4 inches of the surface.

The A horizon has color of 5YR 5/3 or 5/4 or of 7.5YR 5/4 or 5/6. Moist color is 5YR 3/3, 3/4, or 4/4 or 7.5YR 3/4, 3/6, 4/4, or 4/6. The horizon is 10 to 20 percent clay, 15 to 35 percent cobbles and stones, and 0 to 5 percent gravel. Reaction is medium acid or neutral.

The B21t horizon has color of 5YR 4/4 or 4/6 or of 7.5YR 4/4, 4/6, or 5/6. Moist color is 5YR 3/3 or 3/4 or 7.5YR 3/4, 3/6, 4/4, or 4/6. The horizon is very cobbly loam or very cobbly sandy clay loam. It is 18 to 28 percent clay, 40 to 60 percent cobbles and stones, and 0 to 5 percent gravel. Reaction is medium acid to neutral.

The IIB22t horizon has color of 7.5YR 4/4, 4/6, 5/4, or 5/6 or of 10YR 4/6, 5/4, or 5/6. Moist color is 7.5YR 3/4, 3/6, 4/4, or 4/6 or 10YR 4/3, 4/4, or 4/6. The horizon is 40 to 60 percent clay and 60 to 80 percent cobbles, stones, and gravel. Reaction is slightly acid or neutral.

Pedcat Series

The Pedcat series consists of very deep, poorly drained soils on low alluvial fans. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 5 percent.

Soils of the Pedcat series are fine, mixed, thermic Aquic Natrixeralfs.

Typical pedon of Pedcat loam, 0 to 2 percent slopes, about 9 miles north of the city of Los Banos; 1,500 feet east and 1,400 feet north of the southwest corner of sec. 12, T. 9 S., R. 9 E., Ingomar Quadrangle.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; strong fine granular structure; soft, friable, slightly sticky and nonplastic; many very fine and common medium roots; common very fine interstitial pores; slightly acid; abrupt smooth boundary.

A2—2 to 5 inches; light brownish gray (10YR 6/2) and light yellowish brown (10YR 6/4) clay loam, dark grayish brown (10YR 4/2) and brown (10YR 4/3) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine and medium roots; common very fine tubular pores; electrical conductivity is 11 millimhos per centimeter; exchangeable sodium percentage is 21; neutral; abrupt smooth boundary.

B21t—5 to 13 inches; dark grayish brown (10YR 4/2) and light yellowish brown (10YR 6/4) silty clay, very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) moist; strong medium prismatic structure; very hard, very firm, sticky and very plastic; common very fine roots and few fine and medium roots; many very fine tubular pores; many thin pressure faces; many moderately thick clay films in pores; electrical conductivity is 10 millimhos per centimeter; exchangeable sodium percentage is 30; moderately alkaline; clear irregular boundary.

B22t—13 to 23 inches; grayish brown (10YR 5/2) and brownish yellow (10YR 6/6) silty clay, brown (10YR 3/3) and dark yellowish brown (10YR 4/4) moist; strong coarse angular blocky structure; very hard, very firm, sticky and very plastic; few very fine and fine roots and common medium roots; common very fine tubular pores; many moderately thick pressure faces; many moderately thick clay films in pores; slightly effervescent; disseminated lime; electrical conductivity is 14 millimhos per centimeter; exchangeable sodium percentage is 38; moderately alkaline; clear smooth boundary.

B3t—23 to 29 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/4) moist; few fine distinct light brown (7.5YR 6/4) mottles, brown (7.5YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and very plastic; few very fine and medium roots; common very fine tubular pores; many thin pressure faces; many thin clay films in pores; slightly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; electrical conductivity is 15 millimhos per centimeter; exchangeable sodium percentage is 41; strongly alkaline; clear smooth boundary.

C1—29 to 42 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 4/3) moist; weak moderate subangular blocky structure; hard, firm, sticky and very plastic; few very fine roots; many very fine tubular pores; slightly effervescent; disseminated lime; strongly alkaline; clear smooth boundary.

C2—42 to 60 inches; very pale brown (10YR 7/3) clay loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; hard, friable, sticky and very plastic; few very fine roots; many very fine tubular pores; slightly effervescent; disseminated lime; strongly alkaline.

The water table is at a depth of 18 to 36 inches in December through March. The A and B horizons have been mixed by cultivation in some areas. In some areas the A horizon has been removed by erosion. The Bt horizon has at least 1.2 times more clay than the A horizon, except where the A horizon has been mixed with the Bt horizon or has been lost through erosion.

The A1 and A2 horizons have color of 10YR 4/2, 5/2, 5/3, 6/2, 6/3, 6/4, 7/1, 7/3, or 7/4 or of 2.5Y 6/2. Moist color is 10YR 2/2, 3/2, 3/3, 4/2, 4/3, 5/3, or 6/4 or 2.5Y 4/2. Some pedons have mottles that are few, fine, and prominent and have color of 7.5YR 3/4 or 2.5Y 4/4 when moist. The A1 and A2 horizons are loam or clay loam and are 18 to 38 percent clay. Reaction is slightly acid or mildly alkaline.

The Bt horizon has color of 7.5YR 6/4; 10YR 4/2, 5/1, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, or 6/6; or 2.5Y 6/4 or 7/2. Moist color is 7.5YR 4/4; 10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/3, or 5/4; or 2.5Y 4/2, 4/4, or 5/2. Some parts of the B horizon have mottles that are few to common, fine or medium, and distinct or prominent and have color of 7.5YR 3/4, 4/2, 4/4, or 4/6; 5Y 4/2 or 5/1; or N 2/0 when moist. Where the chroma of the matrix is 2 when moist, mottles have chroma of 2 or less. The Bt horizon is clay, silty clay loam, or silty clay. It is 40 to 50 percent clay in the upper part and 30 to 45 percent in the lower part. The exchangeable sodium percentage is 20 to 60. The horizon is noneffervescent to strongly effervescent.

The C horizon has color of 7.5YR 6/6; 10YR 6/4, 6/6, 7/3, 7/4, 7/6, or 8/6; or 2.5Y 5/4, 6/4, or 7/4. Moist color is 7.5YR 4/4 or 4/6; 10YR 4/3, 4/4, 4/6, 5/4, 5/6, 6/4, or 7/4; or 2.5Y 3/2, 4/2, 4/4, or 5/2. In some pedons mottles are few to common, fine or medium, and prominent and have color of 7.5YR 3/2, 4/4, or 5/4; 2.5Y 6/8 or 7/4; 5Y 3/1, 4/3, or 6/1; 5GY 5/1 or 6/1; 5G 5/1 or 6/1; or 5BG 5/1 when moist. The C horizon is clay loam, clay, sandy clay loam, silty clay loam, or sandy clay and is 30 to 45 percent clay. It is noneffervescent to violently effervescent. It is as much as 10 percent brittle durinodes in some pedons. The C horizon is moderately alkaline or strongly alkaline.

Pleito Series

The Pleito series consists of very deep, well drained soils on colluvial and alluvial fans and terraces. These soils formed in calcareous, gravelly alluvium derived from various kinds of rock. Slope is 2 to 30 percent.

Soils of the Pleito series are fine-loamy, mixed, thermic Calcic Pachic Haploxerolls.

Typical pedon of Pleito gravelly clay loam, 15 to 30 percent slopes, about 14 miles south-southeast of the city of Los Banos; 2,200 feet south and 1,500 feet west of the northeast corner of sec. 29, T. 12 S., R. 11 E., Laguna Seca Ranch Quadrangle.

A11—0 to 6 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine roots; many very fine and few fine tubular pores; common thin clay films in pores; slightly effervescent; disseminated lime; 20 percent gravel 2 to 25 millimeters in diameter; moderately alkaline; clear smooth boundary.

A12ca—6 to 11 inches; brown (10YR 4/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine roots; many very fine and few fine tubular pores; many thin clay films in pores; strongly effervescent; lime is disseminated and is segregated as few fine filaments and soft masses; 15 percent gravel 2 to 25 millimeters in diameter; moderately alkaline; clear smooth boundary.

B21tca—11 to 23 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; many very fine tubular pores; many thin clay films in pores; strongly effervescent; lime is disseminated and is segregated as few fine soft masses and common fine filaments; 10 percent gravel 2 to 7 millimeters in diameter; moderately alkaline; abrupt irregular boundary.

B22tca—23 to 40 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; many very fine tubular pores; continuous thin clay films in pores and few thin clay films on peds; strongly effervescent; lime is disseminated and is segregated as common fine and medium soft masses and common fine filaments; 10 percent gravel 2 to 40 millimeters in diameter; moderately alkaline; abrupt wavy boundary.

IIC—40 to 60 inches; extremely gravelly clay loam; 75 percent gravel 2 to 50 millimeters in diameter.

Organic matter content is 1 to 2 percent to a depth of 20 inches or more. The calcium carbonate equivalent is less than 15 percent throughout the profile. Carbonate content increases with increasing depth in most pedons, and the A horizon is noncalcareous in some pedons. Gravel content is 5 to 30 percent in the A and B horizons, and it is less than 30 percent in the C horizon in some pedons. The control section is 20 to 35 percent clay.

The A horizon has color of 10YR 4/2, 4/3, 5/2, 5/3, or 5/4. Moist color is 10YR 3/2 or 3/3. The horizon is clay loam or gravelly clay loam. It is noneffervescent or slightly effervescent. It is mildly alkaline or moderately alkaline.

The B horizon has color of 7.5YR 6/4 or 6/6 or of 10YR 4/3, 5/4, 5/6, 6/3, or 7/4. Moist color is 7.5YR 4/4 or 5/6 or 10YR 3/2 or 3/3 in the upper part and is 10YR 4/3, 4/4, or 5/4 in the lower part. The B horizon is clay loam, gravelly loam, or gravelly clay loam. It is noneffervescent or slightly effervescent.

The C horizon has color of 7.5YR 6/4, 6/6, 6/8, or 7/6; 10YR 5/4, 6/3, 6/4, 7/4, or 7/6; or 2.5Y 6/6 or 7/4. Moist color is 7.5YR 4/4, 4/6, 5/4, or 5/6; 10YR 3/4, 4/3, 4/4, 5/3, 5/4, or 5/6; or 2.5Y 5/4. The C horizon is clay loam, sandy clay loam, gravelly clay loam, or extremely gravelly clay loam. It is slightly effervescent to violently effervescent.

The Pleito soils in map units 209 and 239 have a mollic epipedon that is less than 20 inches deep and have moderately slow permeability. These differences are outside the range for the series; however, they do not significantly affect the use and management of the soils.

Quiensabe Series

The Quiensabe series consists of moderately deep, well drained soils on dissected terraces at high elevations. These soils formed in mixed alluvium derived dominantly from sedimentary or igneous rock. Slope is 30 to 50 percent.

Soils of the Quiensabe series are fine, mixed, thermic Typic Argixerolls.

Typical pedon of a Quiensabe sandy clay loam in an area of Orognen-Quiensabe complex, 30 to 50 percent slopes, about 20 miles southwest of the city of Los Banos; 2,200 feet north and 100 feet east of the northwest corner of sec. 3, T. 13 S., R. 8 E., Ruby Canyon Quadrangle.

A11—0 to 4 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; 5 percent gravel 2 to 10 millimeters in diameter; 31 percent clay; clear smooth boundary.

A12—4 to 14 inches; yellowish brown (10YR 5/4) sandy clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine and fine tubular pores; 5 percent gravel 2 to 10 millimeters in diameter; 2.8 percent organic matter; 34 percent clay; neutral; clear smooth boundary.

B2t—14 to 22 inches; brown (7.5YR 4/4, dry or moist) gravelly clay; strong fine prismatic structure parting to strong fine angular blocky; hard, firm, sticky and very plastic; few very fine roots; common very fine

tubular pores; many thick clay films on peds and bridging sand grains; 20 percent gravel 2 to 10 millimeters in diameter; 40 percent clay; neutral; gradual smooth boundary.

C—22 to 27 inches; brown (7.5YR 4/4), light yellowish brown (10YR 6/4), and red (2.5YR 5/6) very gravelly clay loam, brown (7.5YR 4/4), yellowish brown (10YR 5/4), and red (2.5YR 4/6) moist; massive; hard, friable, sticky and very plastic; few medium roots; few very fine tubular and interstitial pores; many moderately thick clay films bridging sand grains; 40 percent gravel 2 to 20 millimeters in diameter; 35 percent clay; neutral; clear smooth boundary.

IIR—27 inches; fractured sandstone.

Depth to a lithic contact is 20 to 40 inches. The mollic epipedon is 8 to 17 inches thick and is at least one-third as thick as the solum.

The A horizon has color of 10YR 4/2, 5/2, 5/3, or 5/4. Moist color is 10YR 2/2, 3/2, or 3/3. The horizon is sandy clay loam or clay loam. It is 25 to 35 percent clay and as much as 10 percent gravel. Organic matter content is 1 to 3 percent.

The Bt horizon has color of 7.5YR 4/4, 6/4, or 6/6 or of 10YR 5/3, 6/3, or 6/4. Moist color is 7.5YR 4/4, 5/4, or 5/6 or 10YR 4/2, 4/3, 4/4, or 5/4. The horizon is clay loam or gravelly clay. It is 35 to 45 percent clay and 5 to 25 percent gravel. The B horizon has less than 15 percent more clay (absolute) than the A horizon. Reaction is neutral or mildly alkaline.

The C horizon is gravelly clay loam or very gravelly clay loam. It is 30 to 40 percent clay and 15 to 50 percent gravel. This horizon commonly is underlain by fractured sandstone at a depth of 20 to 40 inches, but in some areas it is underlain by consolidated volcanic sediment. Reaction is neutral or mildly alkaline.

Quinto Series

The Quinto series consists of shallow, somewhat excessively drained soils on mountainous uplands. These soils formed in material weathered from sandstone and sandstone conglomerate. Slope is 30 to 75 percent.

Soils of the Quinto series are loamy, mixed, thermic Lithic Mollic Haploxeralfs.

Typical pedon of a Quinto gravelly sandy loam in an area of Quinto-Rock outcrop complex, 50 to 75 percent slopes, about 11 miles west-southwest of the city of Gustine; 2,600 feet east and 900 feet south of the northwest corner of sec. 11, T. 9 S., R. 7 E., Crevison Peak Quadrangle.

A1—0 to 6 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; soft, very friable, sticky and plastic; common very fine roots; few very fine tubular pores; 15 percent gravel 2 to 30 millimeters in diameter; 2.4 percent organic matter; neutral; clear smooth boundary.

B2t—6 to 17 inches; brown (7.5YR 5/4) gravelly sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; few very fine tubular pores; few thin clay films bridging sand grains; 15 percent rounded gravel 25 to 75 millimeters in diameter; neutral; clear smooth boundary.

R—17 inches; sandstone conglomerate.

Depth to a lithic contact is 10 to 20 inches. From 25 to 50 percent of the original surface horizon has been lost through erosion. The profile is 15 to 35 percent gravel and 0 to 5 percent cobbles. Rock fragments are rounded or angular.

The A horizon has color of 5YR 5/4, 7.5YR 4/6, or 10YR 5/3, 5/4, 6/3, or 6/4. Moist color is 5YR 3/4, 7.5YR 3/4, or 10YR 3/4. The horizon is 10 to 20 percent clay and 15 to 35 percent gravel. Reaction is slightly acid or neutral. The A horizon is 1 to 3 percent organic matter.

The B2t horizon has color of 5YR 5/3, 5/4, or 5/6; 7.5YR 5/3, 5/4, or 6/4; or 10YR 5/4, 6/3, or 6/4. Moist color is 5YR 3/3, 3/4, 4/4, or 4/6; 7.5YR 3/4, 4/6, or 5/4; or 10YR 4/3 or 4/4. The horizon is 20 to 35 percent clay. Reaction is slightly acid or mildly alkaline.

The underlying bedrock dominantly is sandstone conglomerate or fractured sandstone but is basic volcanic rock in some pedons.

San Emigdio Series

The San Emigdio series consists of very deep, well drained soils on alluvial fans and streambank overflows. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the San Emigdio series are coarse-loamy, mixed (calcareous), thermic Typic Xerofluvents.

Typical pedon of San Emigdio loam, about 3 miles

southwest of the city of Gustine; 1,800 feet east and 600 feet north of the southwest corner of sec. 24, T. 8 S., R. 8 E., Howard Ranch Quadrangle.

Ap—0 to 14 inches; light yellowish brown (10YR 6/4) loam, dark brown (10YR 3/3) moist; weak moderate subangular blocky structure; hard, friable, slightly sticky and plastic; few fine and medium roots; few very fine and fine tubular pores; 0.83 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C1—14 to 23 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and slightly plastic; few fine roots; few very fine tubular pores; 0.3 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

C2—23 to 39 inches; light yellowish brown (10YR 6/4) silt loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, sticky and slightly plastic; few fine and medium roots; common very fine and few fine tubular pores; 0.32 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C3—39 to 63 inches; light yellowish brown (10YR 6/4) loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; common very fine tubular pores; 0.5 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline.

Organic matter content of the profile is less than 1 percent, and it decreases irregularly with increasing depth. Stratification is common. Clay content is 10 to 18 percent. Many pedons have a small amount of fine segregated lime throughout the profile. Gravel content is 0 to 10 percent.

The A horizon has color of 10YR 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/3, 3/4, 4/3, or 4/4. The horizon is loam or fine sandy loam.

The C horizon has color of 10YR 6/4, 6/6, or 7/6. Moist color is 10YR 4/3, 4/4, 4/6, or 5/6. The horizon is loam, sandy loam, fine sandy loam, or silt loam. It is slightly effervescent to strongly effervescent.

Santanela Series

The Santanela series consists of very deep, very poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Santanela series are fine-loamy, mixed, thermic Typic Natraqualfs.

Typical pedon of Santanela loam, about 6.5 miles northwest of the city of Los Banos; 2,400 feet east and 1,500 feet south of the northwest corner of sec. 25, T. 9 S., R. 9 E., Ingomar Quadrangle.

A1—0 to 3 inches; light brownish gray (10YR 6/2) loam, brown (10YR 4/3) moist; many medium distinct brown (10YR 5/3) and very pale brown (10YR 8/3) mottles, dark gray (10YR 4/1) and light yellowish brown (10YR 6/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few very fine and fine roots; few very fine tubular pores; neutral; clear smooth boundary.

A2—3 to 6 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; many fine prominent strong brown (7.5YR 5/8) mottles, many fine distinct very dark gray (10YR 3/1) and yellowish brown (10YR 5/8) moist; moderate medium and coarse angular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few very fine roots; few very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; abrupt wavy boundary.

B21t—6 to 10 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; many fine and medium prominent strong brown (7.5YR 5/8) and light yellowish brown (10YR 6/4) mottles, many fine distinct yellowish brown (10YR 5/6) and very dark brown (10YR 2/2) moist; strong coarse columnar structure; very hard, firm, sticky and very plastic; few very fine roots; no pores; continuous moderately thick clay films on peds; slightly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; exchangeable sodium percentage is 50; strongly alkaline; clear wavy boundary.

B22t—10 to 14 inches; brown (10YR 5/3, dry or moist) clay loam; many medium distinct dark gray (10YR 4/1) and brownish yellow (10YR 6/6) mottles when moist; strong medium prismatic structure; hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; many thin clay films on peds and bridging sand grains; slightly effervescent; disseminated lime; strongly alkaline; clear smooth boundary.

B3t—14 to 19 inches; brown (10YR 5/3, dry or moist) loam; many medium distinct brownish yellow (10YR 6/6) mottles when moist; moderate medium prismatic structure; very hard, firm, sticky and plastic; few very fine roots; few very fine tubular

pores; many thin clay films on peds, in pores, and bridging sand grains; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C1—19 to 33 inches; brown (10YR 5/3) loam, yellowish brown (10YR 5/4) moist; common medium distinct dark brown (10YR 4/3) mottles when moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots; common very fine tubular pores; many thin clay films on peds and in pores; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C2—33 to 47 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; no mottles; massive; hard, friable, nonsticky and slightly plastic; no roots; few very fine tubular pores; very few very thin clay films bridging sand grains; slightly effervescent; disseminated lime; exchangeable sodium percentage is 51; moderately alkaline; abrupt wavy boundary.

IIC3—47 to 61 inches; grayish brown (10YR 5/2) loam, olive gray (5Y 4/2) and very dark gray (5Y 3/1) moist; common fine and medium distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; slightly hard, firm, sticky and plastic; few very fine interstitial pores; few thin clay films bridging sand grains; strongly effervescent; disseminated lime; moderately alkaline.

In most years the profile is saturated throughout and is covered by stagnant water from September to April.

Thickness of the A horizon is 5 to 14 inches. The control section averages 20 to 35 percent clay. Organic matter content is less than 1 percent in the A horizon, and it decreases regularly with increasing depth. Some pedons are as much as 10 percent gravel 1 to 3 centimeters in diameter.

The A1 horizon has color of 10YR 3/1, 4/1, 5/1, 5/2, 5/3, 5/4, or 6/2 or of 2.5Y 4/2 or 5/2. Moist color is 10YR 3/1, 3/3, 4/3, or 4/4. Reaction is neutral to moderately alkaline. Some pedons do not have mottles.

The A2 horizon has color of 10YR 3/3, 3/4, 5/3, 6/1, 6/2, or 6/3 or of 2.5Y 6/2. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, or 4/4 or 2.5Y 4/2. The horizon is sandy loam, loam, or clay loam. Some pedons do not have mottles.

The Bt horizon has color of 10YR 5/2 or 5/3. Moist color is 10YR 3/2, 4/2, 4/3, 4/4, 5/3, or 5/4; 2.5Y 4/2; or 5Y 5/2 or 5/3. The horizon is loam, clay loam, or sandy clay loam. It is slightly effervescent to strongly effervescent and is moderately alkaline or strongly alkaline. The exchangeable sodium percentage is 15 to 55.

The C horizon has color of 10YR 5/2, 5/3, or 6/3. Moist color is 10YR 3/3, 4/2, 4/3, 5/3, 5/4, or 6/6; 2.5Y 4/2, 4/4, 5/4, or 6/2; or 5Y 3/1 or 4/2. The horizon is sandy loam, loam, or sandy clay loam. It is moderately alkaline or strongly alkaline. The exchangeable sodium percentage is 15 to 55.

San Timoteo Series

The San Timoteo series consists of moderately deep, well drained soils on low foothills. These soils formed in material weathered from calcareous shale or sandstone. Slope is 2 to 30 percent.

Soils of the San Timoteo series are coarse-loamy, mixed (calcareous), thermic Typic Xerorthents.

Typical pedon of a San Timoteo sandy loam in an area of San Timoteo-Wisflat sandy loams complex, 8 to 15 percent slopes, about 10 miles southwest of the city of Los Banos; 2,200 feet north and 600 feet west of the southeast corner of sec. 35, T. 11 S., R. 9 E., Ortigalita Peak Northwest Quadrangle.

A11—0 to 5 inches; pale brown (10YR 6/3) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse angular blocky structure; soft, friable, nonsticky and slightly plastic; many very fine roots; many very fine interstitial pores; strongly effervescent; lime is disseminated and is segregated as common fine and medium soft masses; moderately alkaline; clear smooth boundary.

A12—5 to 16 inches; pale brown (10YR 6/3) sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; soft, friable, nonsticky and slightly plastic; common very fine roots; few very fine tubular pores and many very fine interstitial pores; violently effervescent; lime is disseminated and is segregated as common fine soft masses; moderately alkaline; clear wavy boundary.

C1—16 to 27 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/6) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; few very fine tubular pores and many very fine interstitial pores; violently effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; clear wavy boundary.

C2—27 to 32 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) moist; massive;

slightly hard, friable, nonsticky and slightly plastic; few very fine roots; few very fine tubular pores and many very fine interstitial pores; violently effervescent; lime is disseminated and is segregated as few fine soft masses; moderately alkaline; abrupt wavy boundary.

Cr—32 to 52 inches; strongly weathered, calcareous sandstone.

Depth to a paralithic contact is 20 to 40 inches. The soils are slightly effervescent to violently effervescent throughout; content of lime generally increases with increasing depth.

The A horizon has color of 10YR 6/3 or 6/4. Moist color is 10YR 4/3 or 4/4. The horizon is 8 to 18 percent clay.

The C horizon has color of 10YR 6/3, 6/4, 7/3, or 7/4. Moist color is 10YR 5/4 or 5/6. The horizon is sandy clay loam, fine sandy loam, or loam and is 8 to 18 percent clay.

Sehorn Series

The Sehorn series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from shale and sandstone. Slope is 30 to 50 percent.

Soils of the Sehorn series are fine, montmorillonitic, thermic Entic Chromoxererts.

Typical pedon of a Sehorn clay in an area of Sehorn-Contra Costa complex, 30 to 50 percent slopes, about 11 miles west-southwest of the city of Gustine; 1,400 feet west and 800 feet south of the northeast corner of sec. 11, T. 9 S., R. 7 E., Crevison Peak Quadrangle.

A11—0 to 3 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong medium subangular and angular blocky structure; very hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

A12—3 to 7 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong coarse and very coarse angular blocky structure; extremely hard, friable, very sticky and very plastic; few very fine roots; common very fine tubular pores; neutral; clear smooth boundary.

C1—7 to 21 inches; yellowish brown (10YR 5/4) clay, brown (7.5YR 4/4) moist; strong coarse and very coarse prismatic structure; very hard, friable, sticky and very plastic; few very fine roots concentrated along vertical faces of peds; few very fine tubular pores; many moderately thick pressure faces; neutral; gradual smooth boundary.

C2—21 to 26 inches; strong brown (7.5YR 5/6) and light yellowish brown (10YR 6/4) clay, brown (7.5YR 4/4) and yellowish brown (10YR 5/6) moist; moderate coarse subangular blocky structure; very hard, friable, sticky and very plastic; few very fine roots; common very fine tubular pores; many moderately thick pressure faces; neutral; irregular smooth boundary.

R—26 inches; fractured shale and fine-grained sandstone; roots and soil material fill fractures.

Depth to fractured bedrock is 23 to 40 inches. When the soil is dry, cracks 1 to 2 centimeters wide extend to a depth of 20 inches or to bedrock. The cracks are 2.5 to 5.0 centimeters wide at the surface. Few to many intersecting slickensides are present in the C horizon.

The A horizon has color of 7.5YR 5/4 or 5/6 or of 10YR 5/3 or 5/4. Moist color is 7.5YR 4/4 or 4/6 or 10YR 4/3 or 4/4. The A horizon is 40 to 50 percent clay. Organic matter content is 1 to 3 percent.

The C horizon has color of 7.5YR 5/4 or 5/6 or of 10YR 5/4 or 6/4. Moist color is 7.5YR 4/4 or 4/6 or 10YR 4/4 or 5/6. The horizon is clay or silty clay and is 40 to 50 percent clay. It is neutral or mildly alkaline.

The underlying shale and sandstone are fractured in the upper 5 to 10 inches.

Most of the Sehorn soils in this survey area have hue of 7.5YR, which is outside the range for the series. This difference, however, does not significantly affect their use and management.

Stanislaus Series

The Stanislaus series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Stanislaus series are fine, montmorillonitic, thermic Typic Haploxerolls.

Typical pedon of Stanislaus clay loam, about 4.5 miles southwest of the city of Gustine; 1,600 feet north and 550 feet west of the southeast corner of sec. 22, T. 8 S., R. 8 E., Howard Ranch Quadrangle.

Ap1—0 to 11 inches; dark grayish brown (10YR 4/2) clay loam, dark brown (10YR 3/3) moist; strong very coarse and medium subangular blocky structure; very hard, friable, sticky and very plastic; few very fine roots; few very fine tubular pores; 38 percent clay; electrical conductivity is 1.9 millimhos per

centimeter; exchangeable sodium percentage is 7; moderately alkaline; abrupt smooth boundary.

Ap2—11 to 15 inches; dark brown (10YR 3/3) clay loam, dark brown (10YR 3/3) moist; strong coarse subangular blocky structure; very hard, friable, sticky and very plastic; few very fine roots; few very fine tubular pores; 1.3 percent organic matter; moderately alkaline; abrupt smooth boundary.

A1—15 to 19 inches; dark brown (10YR 3/3) clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; very hard, friable, sticky and very plastic; few very fine roots; few very fine tubular pores; moderately alkaline; clear smooth boundary.

B21t—19 to 30 inches; dark brown (10YR 3/3) and brown (10YR 4/3) clay, very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) moist; strong medium subangular blocky structure; very hard, friable, sticky and very plastic; few very fine roots; few very fine tubular pores; 0.7 percent organic matter; 42 percent clay; many thin clay films in pores; continuous thin pressure faces; 1 percent gravel 2 to 5 millimeters in diameter; moderately alkaline; clear wavy boundary.

B22t—30 to 39 inches; brown (10YR 4/3) and dark brown (10YR 3/3) clay, dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; many thin clay films in pores; many thin pressure faces; moderately alkaline; clear smooth boundary.

C1ca—39 to 48 inches; yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 4/6) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 36 percent clay; common thin pressure faces; 10 percent calcium carbonate equivalent; slightly effervescent; lime is disseminated and is segregated as common fine rounded filaments and soft masses; moderately alkaline; clear wavy boundary.

C2ca—48 to 65 inches; yellowish brown (10YR 5/6) clay loam, dark yellowish brown (10YR 4/6) moist; moderate medium subangular blocky structure; very hard, very friable, sticky and plastic; no roots; common very fine tubular pores; many thin pressure faces; 10 percent calcium carbonate equivalent; slightly effervescent; lime is disseminated and is segregated as common fine rounded filaments and soft masses; moderately alkaline.

Clay content of the A horizon is 35 to 40 percent. Clay content of the B2t horizon is 38 to 45 percent, and it is less than 1.2 times more than that of the A horizon. Clay content of the C horizon is 25 to 40 percent. Cracks are 1 to 4 centimeters wide at the surface, but they are less than 1 centimeter wide at a depth of 20 inches. Organic matter content generally is 1 to 2 percent, but it is less than 1 percent at a depth of 20 inches. Disseminated lime is at a depth of 25 inches in some pedons, but segregated lime is below a depth of 36 inches. The exchangeable sodium percentage is less than 8.

The A horizon is 10YR 3/3, 4/2, 4/3, 5/2, 5/3, or 5/4. Moist color is 10YR 2/2, 3/2, or 3/3. The horizon is as much as 10 percent gravel 5 to 20 millimeters in diameter. The electrical conductivity is less than 2 millimhos per centimeter. Reaction is mildly alkaline or moderately alkaline.

The B2t horizon has color of 10YR 3/2, 3/3, 4/3, 5/4, 5/6, or 6/4. Moist color is 10YR 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 4/6, or 5/4. The horizon is clay loam or clay. Reaction is mildly alkaline or moderately alkaline.

The Cca horizon has color of 10YR 3/3, 4/3, 4/4, 4/6, 5/4, 5/6, 5/8, or 7/4 or of 7.5YR 5/6. Moist color is 10YR 3/6, 4/3, 4/4, 4/6, 4/8, 5/3, or 5/4 or 7.5YR 4/4. Typically, the horizon is loam or clay loam, but it is clay in the upper part in some pedons. The horizon is slightly effervescent or strongly effervescent. Calcium carbonate equivalent is less than 15 percent. Reaction is mildly alkaline or moderately alkaline. Mottles, which occur when the soils are wet, have color of N 2/0 or 3/0 or of 10YR 2/1.

Triangle Series

The Triangle series consists of very deep, very poorly drained soils in the valley basin. These soils have wide cracks and a high concentration of sodium. They formed in mixed alluvium derived dominantly from sedimentary and granitic rock. Slope is 0 to 2 percent.

Soils of the Triangle series are fine, montmorillonitic, thermic Aquic Chromoxererts.

Typical pedon of Triangle clay, about 8 miles northwest of the city of Los Banos; 660 feet east and 50 feet south of the northwest corner of sec. 8, T. 9 S., R. 10 E., Ingomar Quadrangle.

A11—0 to 1 inch; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; strong thick platy structure; cracks 3 centimeters wide; extremely hard, friable, very sticky and plastic; few very fine roots; common very fine tubular pores; strongly effervescent;

disseminated lime; moderately alkaline; abrupt smooth boundary.

A12g—1 to 7 inches; dark gray (5Y 4/1) clay, dark olive gray (5Y 3/2) moist; many medium prominent olive (5Y 5/3) and light gray (5Y 7/2) mottles, olive (5Y 4/3) and light gray (5Y 7/1) moist; strong very coarse and coarse prismatic structure; cracks 3 centimeters wide; extremely hard, friable, sticky and plastic; common very fine roots; common very fine tubular and interstitial pores; strongly effervescent; lime is disseminated and is segregated as fine soft masses; moderately alkaline; clear smooth boundary.

A13g—7 to 15 inches; olive gray (5Y 5/2) clay, dark olive gray (5Y 3/2) moist; many medium prominent olive (5Y 5/3) and light gray (5Y 7/2) mottles, black (5Y 2/1), dark olive gray (5Y 3/2), and light gray (5Y 7/2) moist; strong very coarse prismatic structure; slickensides intersecting peds at 20 degrees to horizontal; cracks 2 centimeters wide; extremely hard, friable, sticky and very plastic; common very fine tubular and interstitial pores; strongly effervescent; lime is disseminated and is segregated as fine soft masses; exchangeable sodium percentage is 4; moderately alkaline; clear smooth boundary.

A14g—15 to 34 inches; olive gray (5Y 5/2) clay, dark olive gray (5Y 3/2) moist; many medium distinct black (5Y 2/2) mottles when moist; strong very coarse prismatic structure; sphenoids at 35 degrees to horizontal; cracks 1.5 centimeters wide; extremely hard, firm, sticky and very plastic; few very fine roots; common very fine tubular and interstitial pores; strongly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

C1g—34 to 42 inches; pale yellow (2.5Y 7/4) clay loam, olive (5Y 4/3) moist; many fine prominent yellowish brown (10YR 5/8) mottles, many medium prominent yellowish brown (10YR 5/6) and olive (5Y 5/6) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine tubular pores and common very fine interstitial pores; violently effervescent; disseminated lime; exchangeable sodium percentage is 32; strongly alkaline; clear smooth boundary.

C2—42 to 61 inches; very pale brown (10YR 7/3) clay loam, olive (5Y 5/6) moist common medium prominent yellowish brown (10YR 5/8) mottles when moist; massive; very hard, friable, sticky and very plastic; few very fine tubular pores and common very fine interstitial pores; violently effervescent; disseminated lime; exchangeable sodium percentage is 24; very strongly alkaline; abrupt smooth boundary.

IIC3—61 to 70 inches; very pale brown (10YR 7/3) clay loam, olive (5Y 4/3) moist; many fine prominent yellowish brown (10YR 5/6) and dark brown (10YR 3/3) mottles when moist; massive; 10 percent weakly cemented durinodes 5 to 15 millimeters in diameter; extremely hard, firm, sticky and plastic; violently effervescent; disseminated lime; very strongly alkaline.

In most years the profile is saturated throughout from September through April by a water table and stagnant surface water. The profile has cracks that are 2 to 8 centimeters wide at the surface and 1 to 2 centimeters wide at a depth of 34 inches from May 1 to September 15. Depth to the lower part of the C horizon is 45 to 70 inches.

The A horizon is 20 to 37 inches thick. It is 40 to 60 percent clay. Intersecting slickensides and sphenoids are present below the A11 horizon. In some pedons the A11 and A12g horizons are noneffervescent. The A horizon has color of 5Y 4/1, 5/1, or 5/2; 2.5Y 5/2; 10YR 4/1; or N 3/0. Moist color is 5Y 2/1, 3/2, 4/1, or 4/2; 2.5Y 4/2; or 10YR 3/1 or 4/1. Mottles are not present in some pedons. Some pedons have iron manganese shotlike concretions. Some pedons have a ⅛-inch-thick white salt crust. The electrical conductivity is 1 to 8 millimhos per centimeter. The exchangeable sodium percentage is 1 to 27. Reaction is moderately alkaline or strongly alkaline.

The C1g and C2 horizons have color of 5Y 6/2, 6/3, 7/2, or 7/3; 2.5Y 6/2, 7/2, or 7/4; or 10YR 5/2 or 7/3. Moist color is 5Y 4/3, 4/4, 5/2, 5/3, or 5/6; 2.5Y 4/2 or 4/4; or 10YR 3/3. Mottles are not present in some pedons. The C1g and C2 horizons are clay loam or clay and are 35 to 60 percent clay. They are slightly effervescent to violently effervescent. Electrical conductivity is 8 to 16 millimhos per centimeter. Reaction is moderately alkaline or strongly alkaline.

The IIC3 horizon has color of 5Y 5/2, 5/3, 6/3, or 7/3; 2.5Y 6/2, 7/2, or 7/4; or 10YR 7/3. Moist color is 5Y 3/2, 4/3, 5/2, or 5/3. The IIC3 horizon is loam, clay loam, silty clay loam, clay, or silty clay and is 22 to 60 percent clay. The horizon is 1 to 20 percent weakly cemented durinodes 2 to 20 millimeters in diameter. It is slightly effervescent to violently effervescent. Electrical conductivity is more than 16 millimhos per centimeter. Exchangeable sodium percentage is 5 to 30. Reaction is moderately alkaline to very strongly alkaline. The IIC3 horizon is stratified in some pedons.

Trulae Series

The Trulae series consists of very deep, somewhat poorly drained soils in the valley basin. These soils have a high amount of exchangeable sodium below a depth of 15 inches. They formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Trulae series are very fine, montmorillonitic, thermic Aquic Chromoxererts.

Typical pedon of Trulae silty clay, partially drained, about 5 miles northwest of the city of Los Banos; 2,700 feet east and 100 feet south of the northwest corner of sec. 28, T. 9 S., R. 10 E., Ingomar Quadrangle.

Ap1—0 to 6 inches; grayish brown (10YR 5/2) silty clay, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; extremely hard, friable, sticky and plastic; few fine and medium roots; few very fine tubular pores; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

Ap2—6 to 10 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong medium and coarse subangular blocky structure; extremely hard, firm, sticky and plastic; few very fine and fine roots; common very fine tubular pores; 1.8 percent organic matter; few thin pressure faces; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

AC—10 to 15 inches; brown (10YR 5/3) silty clay, very dark grayish brown (10YR 3/2) moist; few fine distinct gray (5Y 5/1) mottles, olive brown (2.5Y 4/4) moist; strong coarse and very coarse prismatic structure; extremely hard, extremely firm, sticky and plastic common very fine and few fine roots; common very fine tubular pores; few thin pressure faces; slightly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C1—15 to 45 inches; brown (10YR 5/3) clay, olive brown (2.5Y 4/4) moist; few fine distinct dark grayish brown (2.5Y 4/2) mottles when moist; moderate medium and coarse angular blocky structure; very hard, very firm, sticky and plastic; few very fine tubular pores; few thin pressure faces; slightly effervescent; disseminated lime; electrical conductivity is 6 millimhos per centimeter; exchangeable sodium percentage is 42; moderately alkaline; clear smooth boundary.

C2ca—45 to 63 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; massive; hard, firm, slightly sticky and plastic; no roots; common very fine tubular pores; few thin pressure faces; strongly effervescent; disseminated lime; 10 percent durinodes; moderately alkaline.

Cracks that are 2.5 to 8.0 centimeters wide at the surface and 1 to 2 centimeters wide at a depth of 20 inches are present from May 1 to November 15 in nonirrigated areas. A seasonal high water table is at a depth of 48 to 60 inches in December through March. Some areas are artificially drained.

The A horizon is 10 to 18 inches thick. It has color of 10YR 4/2, 5/2, or 5/3 or of 2.5Y 5/2. Moist color is 10YR 3/2, 3/3, 4/3, or 4/4 or 2.5Y 4/2 or 4/4. Clay content is 40 to 60 percent. Intersecting slickensides and wedge-shaped structural aggregates occur throughout the A horizon. The horizon is noneffervescent or slightly effervescent.

The C horizon has color of 10YR 5/2 or 5/3; 2.5Y 5/4 or 6/2; or 5Y 4/4. Moist color is 10YR 3/2 or 4/4; 2.5Y 4/2 or 4/4; or 5Y 6/4. In some horizons there are few to many, faint to prominent mottles that have color of 7.5YR 4/6, 10YR 4/6, 2.5Y 4/2, or 5Y 5/1 or 6/1. Clay content is 60 to 65 percent in the upper part of the C horizon and 30 to 40 percent in the lower part. The calcium carbonate equivalent is less than 15. The exchangeable sodium percentage is 15 to 50.

Tunehill Series

The Tunehill series consists of shallow, well drained soils on dissected terraces at high elevations. These soils formed in mixed consolidated alluvium derived dominantly from basic igneous rock. Slope is 30 to 50 percent.

Soils of the Tunehill series are loamy, mixed, thermic, shallow Typic Haploxerolls.

Typical pedon of a Tunehill loam in an area of Tunehill-Quiensabe complex, 30 to 50 percent slopes, about 18 miles southwest of the city of Los Banos; 2,600 feet south and 1,400 feet west of the northeast corner of sec. 16, T. 12 S., R. 8 E. (projected section lines from sec. 18, T. 12 S., R. 9 E.), Los Banos Valley Quadrangle.

A1—0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; common fine and medium angular blocky and platy structure; slightly hard, friable, sticky and plastic; common very fine roots; few very fine tubular pores; 3.2 percent organic matter; mildly alkaline; clear smooth boundary.

B21—7 to 11 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; common fine and medium

angular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; 5 percent soft, angular, consolidated fragments 2 to 5 millimeters in diameter; 0.9 percent organic matter; mildly alkaline; abrupt irregular boundary.

Cr—11 to 60 inches; white (10YR 8/2), soft, consolidated volcanic sediment, pale brown (10YR 6/3) moist.

Depth to a paralithic contact is 10 to 15 inches. In some pedons the mollic epipedon extends to a paralithic contact in the B2 horizon. From 25 to 75 percent of the original surface layer has been lost through erosion.

The A1 horizon has color of 10YR 4/2, 5/1, 5/2, or 5/3 or of 2.5Y 5/2. Moist color is 10YR 3/2 or 3/3 or 2.5Y 3/2. Clay content is 15 to 25 percent. Organic matter content is 1 to 4 percent. Reaction is neutral to moderately alkaline.

The B2 horizon has color of 10YR 5/3, 5/4, 6/3, or 6/4. Moist color is 10YR 3/3, 4/2, 4/3, 4/4, or 5/4. The B2 horizon is loam or silt loam and is 18 to 27 percent clay. Reaction is mildly alkaline or moderately alkaline.

The consolidated volcanic sediment has strata of varying types of material and varying degrees of hardness. The sediment is gravelly in some pedons.

Turlock Series

The Turlock series consists of very deep, very poorly drained soils on the valley basin rim and on low alluvial fans. These soils have a high concentration of sodium in the B horizon. They formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Turlock series are fine-loamy, mixed, thermic Albic Natraqualfs.

Typical pedon of Turlock sandy loam, about 9 miles north-northwest of the city of Los Banos; 2,000 feet east and 800 feet north of the southwest corner of sec. 5, T. 9 S., R. 10 E., Ingomar Quadrangle.

A1—0 to 3 inches; grayish brown (10YR 5/2) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; mildly alkaline; clear smooth boundary.

A2—3 to 4 inches; olive gray (5Y 5/2) loam, dark gray (5Y 4/1) moist; many fine prominent light olive brown (2.5Y 5/6) mottles, common fine distinct olive gray (5Y 5/2) moist; moderate medium subangular blocky structure; very hard, friable, sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; mildly alkaline; abrupt smooth boundary.

B21tg—4 to 11 inches; olive gray (5Y 4/2 and 5/2) clay loam, very dark gray (5Y 3/1) moist; common medium prominent yellowish brown (10YR 5/8) mottles, dark yellowish brown (10YR 4/4) moist; strong medium columnar structure; extremely hard, friable, sticky and plastic; common very fine roots; many very fine and few fine tubular and interstitial pores; few thin clay films on peds; exchangeable sodium percentage is 2; mildly alkaline; clear smooth boundary.

B22tg—11 to 25 inches; olive gray (5Y 5/2) clay loam, dark olive gray (5Y 3/2) moist; common fine prominent black (5Y 2/1) and olive (5Y 5/6) mottles, many large prominent black (5Y 2/1) and olive (5Y 5/6) moist; moderate medium prismatic and subangular blocky structure; extremely hard, friable, sticky and plastic; common very fine roots; common very fine interstitial pores; common thin clay films on peds; exchangeable sodium percentage is 15; moderately alkaline; clear smooth boundary.

B3tca—25 to 36 inches; grayish brown (2.5Y 5/2) clay loam, very dark grayish brown (2.5Y 3/2) moist; few medium prominent yellow (2.5Y 7/6) and very dark gray (N 3/0) mottles, many medium prominent dark gray (N 4/0) and olive yellow (2.5Y 6/6) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots; common very fine and fine tubular pores; few thin clay films on peds; strongly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

C1ca—36 to 55 inches; grayish brown (2.5Y 5/2) clay loam, olive (5Y 5/4) moist; few fine distinct olive yellow (2.5Y 6/6) mottles, many medium prominent olive yellow (5Y 6/6) and pale yellow (5Y 7/4) moist; massive; very hard, firm, sticky and plastic; no roots; few very fine tubular pores; violently effervescent; disseminated lime; exchangeable sodium percentage is 17; strongly alkaline; clear smooth boundary.

IIC2gca—55 to 60 inches; pale yellow (5Y 7/3) silty clay loam, olive (5Y 5/4) moist; many medium prominent yellowish brown (10YR 5/8) mottles, many medium prominent light olive brown (2.5Y 5/6) and light yellowish brown (2.5Y 6/4) moist; massive; hard, firm, sticky and very plastic; few very fine interstitial

pores; violently effervescent; disseminated lime; strongly alkaline.

In most years the profile is saturated throughout from September through April by a water table and stagnant surface water. Depth to the natric horizon is 9 to 28 inches. The textural control section is 20 to 35 percent clay. Organic matter content is 1 to 4 percent in the A horizon and is less than 1 percent in the B and C horizons. The upper part of the Bt horizon is less than 15 percent exchangeable sodium.

The A1 horizon has color of 10YR 4/2, 5/2, 5/3, or 6/3. Moist color is 5Y 4/2, 5/1, or 5/2; 2.5Y 4/2; or 10YR 2/1, 2/2, 3/1, 3/2, 4/3, 4/4, or 5/3. The horizon is sandy loam or loam. Reaction is mildly alkaline or moderately alkaline.

The A2 horizon has color of 5Y 4/1 or 5/2 or 10YR 6/3 or 7/1 when dry or moist. Some pedons do not have mottles. The horizon is sandy loam, fine sandy loam, or loam. Reaction is neutral to moderately alkaline.

The B horizon has color of 2.5Y 5/2; 5Y 4/2, 5/2, or 5/3; or 10YR 5/2. Moist color is 2.5Y 3/2, 4/2, or 4/4; 5Y 3/1, 3/2, 4/3, or 5/2; or 10YR 3/1, 3/2, 4/2, 4/4, or 5/3. The horizon is clay loam or loam. Some pedons are strongly effervescent throughout. Reaction is mildly alkaline to strongly alkaline. The electrical conductivity is 15 to 35 millimhos per centimeter. The exchangeable sodium percentage is 15 to 35, except in the upper part of the Bt horizon, which is less than 15.

The C horizon is 5Y 7/3; 2.5Y 5/2, 5/4, 6/4, or 7/4; or 10YR 8/2. Moist color is 5Y 5/4 or 2.5Y 4/2, 5/4, or 6/4. The horizon is sandy clay loam, silty clay loam, loam, or clay loam. Calcium carbonate equivalent is 2 to 15 percent. Reaction is moderately alkaline or strongly alkaline. The exchangeable sodium percentage is 15 to 25. In some pedons the lower part of the C horizon has as much as 5 percent durinodes 10 to 15 millimeters in diameter, or it is stratified.

Turmound Series

The Turmound series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from granitic rock. Slope is 0 to 2 percent.

Soils of the Turmound series are fine-loamy, mixed, thermic Glossic Natraqualfs.

Typical pedon of Turmound sandy loam, about 8 miles north-northwest of the city of Los Banos; 400 feet east and 400 feet north of the southwest corner of sec. 4, T. 9 S., R. 10 E., Ingomar Quadrangle.

A11—0 to 3 inches; dark gray (10YR 4/1) sandy loam, very dark brown (10YR 2/2) moist; moderate thick platy structure; loose, nonsticky and nonplastic; few fine and common medium roots; many fine interstitial pores; moderately alkaline; abrupt smooth boundary.

A12—3 to 11 inches; gray (10YR 5/1) sandy loam, very dark grayish brown (10YR 3/2) moist; massive parting to weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine tubular and interstitial pores; strongly alkaline; clear wavy boundary.

A13—11 to 13 inches; gray (10YR 5/1) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; very hard, very firm, nonsticky and nonplastic; few very fine and fine roots; few very fine tubular pores and common very fine interstitial pores; strongly alkaline; abrupt wavy boundary.

IIB21t—13 to 15 inches; grayish brown (10YR 5/2) sandy clay loam, dark grayish brown (2.5Y 4/2) and very dark grayish brown (10YR 3/2) moist; weak medium and coarse prismatic structure; very hard, firm, slightly sticky and plastic; few very fine and fine roots; few very fine and fine tubular pores; common thin clay films on peds and in pores; strongly alkaline; clear wavy boundary.

IIB22t—15 to 20 inches; grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; few fine distinct black (N 2/0) manganese stains; weak medium and coarse prismatic structure; very hard, firm, slightly sticky and plastic; few very fine roots; few very fine tubular pores; common thin clay films on peds and in pores; strongly alkaline; clear irregular boundary.

IIB3t—20 to 30 inches; brown (10YR 5/3) and pale brown (10YR 6/3) sandy clay loam, olive brown (2.5Y 4/4) moist; few medium faint light olive brown (2.5Y 5/4) mottles when moist; few fine white (10YR 8/2) masses of lime; massive parting to weak medium and coarse angular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine and fine tubular pores; common thin clay films bridging sand grains; slightly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; strongly alkaline; clear wavy boundary.

IIC1—30 to 38 inches; grayish brown (10YR 5/2) sandy clay loam, olive brown (2.5Y 4/4) moist; common fine brownish yellow (10YR 6/6) mottles, few fine faint light olive brown (2.5Y 5/4) moist; hard, firm, slightly sticky and plastic; common very fine and fine roots; common very fine and few fine tubular

pores; common thin clay films bridging sand grains; slightly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; strongly alkaline; clear irregular boundary.

IIIC2ca—38 to 60 inches; light brownish gray (2.5Y 6/2) clay, olive brown (2.5Y 4/4) moist; few fine distinct olive yellow (2.5Y 6/6) and white (2.5Y 8/2) mottles, many fine to large prominent dark greenish gray (5G 4/1) moist; massive; hard, friable, slightly sticky and plastic; few very fine and fine roots; few very fine tubular pores; common thin clay films bridging sand grains; slightly effervescent; lime is disseminated and is segregated as many fine irregular soft masses; strongly alkaline.

The A horizon has color of 10YR 3/2, 3/3, 4/1, 5/1, or 5/2. Moist color is 10YR 2/2, 3/1, 3/2, or 4/2. The horizon is 7 to 24 inches thick. It generally is strongly alkaline throughout but is moderately alkaline in the upper 3 inches in some pedons. Typically, exchangeable sodium percentage is more than 15 between depths of 3 and 13 inches, but it ranges from 15 to 43 percent. The electrical conductivity is 8 to 16 millimhos per centimeter.

The B horizon has color of 10YR 3/2, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/3, or 6/6; 2.5Y 4/4; or 5Y 4/3 or 5/3. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, or 5/3; 2.5Y 4/2 or 4/4, or 5Y 5/3. The horizon is sandy clay loam or clay loam and is 20 to 35 percent clay. Exchangeable sodium percentage is 15 to 45. The electrical conductivity is 8 to 16 millimhos per centimeter.

The C horizon has color of 10YR 5/1, 5/2, 6/1, 6/2, 6/3, or 7/2 or of 2.5Y 6/2. Moist color is 10YR 3/2, 3/3, 4/2, 4/3, 5/3, or 6/2; 2.5Y 4/4; or 5Y 4/3, 5/2, or 5/3. The horizon is sandy clay loam, clay loam, clay, silty clay loam, or loam and is 25 to 45 percent clay. Exchangeable sodium percentage is 15 to 45. The electrical conductivity is 8 to 16 millimhos per centimeter.

Vernalis Series

The Vernalis series consists of very deep, well drained soils on alluvial fans and flood plains. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 2 to 5 percent.

Soils of the Vernalis series are fine-loamy, mixed, thermic Calcixerollic Xerochrepts.

Typical pedon of Vernalis loam, 2 to 5 percent slopes, about 15 miles south of the city of Los Banos; 400 feet east and 300 feet north of the southwest corner of sec. 35, T. 12 S., R. 10 E., Laguna Seca Ranch Quadrangle.

A1—0 to 7 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 3/4) moist; moderate medium prismatic structure; hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and few fine tubular pores; mildly alkaline; clear smooth boundary.

B1t—7 to 15 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; moderate fine prismatic structure and moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine, common fine, and few medium tubular pores; common thin clay films in pores; slightly effervescent; disseminated lime; electrical conductivity is 0.5 millimho per centimeter; moderately alkaline; clear wavy boundary.

B21tca—15 to 22 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and few fine and medium tubular pores; common thin clay films in pores; strongly effervescent; lime is disseminated and is segregated as many fine filaments; moderately alkaline; clear irregular boundary.

B22tca—22 to 28 inches; light yellowish brown (10YR 6/4) clay loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few fine and medium tubular pores; common thin clay films in pores; strongly effervescent; lime is disseminated and is segregated as common fine filaments; moderately alkaline; gradual wavy boundary.

C—28 to 60 inches; yellowish brown (10YR 5/4) silty clay loam, brown (10YR 4/3) moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and common fine tubular pores; common thin clay films in pores; strongly effervescent; disseminated lime; moderately alkaline.

The A horizon has color of 10YR 5/4, 5/6, 6/3, or 6/4. Moist color is 10YR 3/3, 3/4, or 4/3. Clay content is 18 to 27 percent. Organic matter content is less than 1 percent.

The B horizon has color of 10YR 5/3, 5/4, or 6/4 or of 2.5Y 6/2 or 6/4. Moist color is 10YR 4/3 or 4/4 or 2.5Y

4/2 or 4/4. The horizon is loam or clay loam and is 20 to 30 percent clay.

The C horizon has color of 10YR 5/4, 6/3, or 6/4 or of 2.5Y 6/2 or 6/4. Moist color is 10YR 4/3, 4/4, or 5/6 or 2.5Y 4/2 or 4/4. The horizon is sandy loam, clay loam, or silty clay loam and is 10 to 30 percent clay. It is slightly effervescent to strongly effervescent.

The Vernalis soils in this survey area have lime at a depth of less than 20 inches, which is outside the range for the series. This difference, however, does not significantly affect use and management.

Volta Series

The Volta series consists of deep, poorly drained soils on the valley basin rim. These soils have a high concentration of sodium and have a duripan. They formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Volta series are fine, mixed, thermic Typic Natraqualfs.

Typical pedon of Volta clay loam, about 10 miles northwest of the city of Los Banos; 2,300 feet west and 300 feet north of the southeast corner of sec. 10, T. 9 S., R. 9 E., Ingomar Quadrangle.

A1—0 to 1 inch; light gray (2.5Y 7/2) clay loam, light olive brown (2.5Y 5/4) moist; moderate medium platy structure; slightly hard, friable, sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular pores; slightly effervescent; disseminated lime; strongly alkaline; abrupt smooth boundary.

B21tca—1 to 4 inches; grayish brown (2.5Y 5/2) clay loam, light olive brown (2.5Y 5/4) moist; strong medium angular blocky structure; hard, firm, very sticky and plastic; few medium roots and common very fine and fine roots; many very fine tubular pores; many thin pressure faces; violently effervescent; disseminated lime; strongly alkaline; abrupt wavy boundary.

B22t—4 to 11 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 3/3) moist; strong medium columnar structure; very hard, firm, sticky and very plastic; few medium roots and common very fine and fine roots; many very fine tubular pores; many moderately thick pressure faces; slightly effervescent; disseminated lime; electrical conductivity is 3 millimhos per centimeter; exchangeable sodium percentage is 23; moderately alkaline; clear smooth boundary.

B3tgca—11 to 26 inches; very pale brown (10YR 7/4) clay loam, yellowish brown (10YR 5/6) moist; many medium prominent gray (5Y 6/1) mottles, greenish gray (5GY 5/1) moist; strong medium prismatic structure; very hard, firm, sticky and very plastic; few fine and common very fine roots; many very fine tubular pores; many thin pressure faces; strongly effervescent; lime is disseminated and is segregated as common fine irregular soft masses; electrical conductivity is 2.3 millimhos per centimeter; exchangeable sodium percentage is 11; moderately alkaline; clear smooth boundary.

C1gca—26 to 46 inches; gray (5Y 5/1) and very pale brown (10YR 7/3) clay loam, very dark gray (5Y 3/1), olive (5Y 5/3), and light yellowish brown (10YR 6/4) moist; massive; hard, friable, sticky and plastic; few very fine roots; few fine tubular pores; strongly effervescent; lime is disseminated and is segregated as common fine irregular soft masses; moderately alkaline; abrupt smooth boundary.

IIC2si—46 to 60 inches; light gray (10YR 7/2), pale brown (10YR 6/3), and gray (5Y 6/1) duripan (20 percent durinodes), brown (10YR 5/3) and dark brown (10YR 3/3) moist; many medium prominent greenish gray (5GY 5/1) mottles when moist.

In most years the profile is saturated at a depth of 12 inches from December through March because of a perched water table. Some areas are artificially drained. Depth to the duripan is 45 to 55 inches. The A horizon is 27 to 38 percent clay. The Bt horizon is 35 to 50 percent clay and has at least 8 percent more clay (absolute) than the A horizon. The Cca horizon is 30 to 45 percent clay. The exchangeable sodium percentage of the Bt horizon is 15 to 30.

The A horizon has color of 10YR 4/2, 5/1, 6/2, or 6/3 or of 2.5Y 4/4, 5/2, 6/2, or 7/2. Moist color is 10YR 3/2, 4/2, 5/2, or 5/4; 2.5Y 3/2, 4/2, 5/2, or 5/4; or 5Y 4/3. Some pedons have mottles when moist. The horizon is 27 to 40 percent clay. The electrical conductivity is less than 2 millimhos per centimeter, and the exchangeable sodium percentage is less than 15. Reaction is mildly alkaline to strongly alkaline. Some pedons do not contain lime. Some pedons in areas that have been leveled do not have an A horizon. Some pedons have an A2 horizon.

The Bt horizon has color of 10YR 6/3 or 7/4 or of 2.5Y 5/2 or 6/2. Moist color is 10YR 3/2, 3/3, 4/4, 5/4, 5/6, or 6/3; 2.5YR 3/2, 4/2, or 5/4; or 5Y 4/1, 4/2, 5/1, or 5/3. In some pedons mottles are few, fine, and distinct to common, medium, and prominent and have color of 10YR 6/3 or 7/4, 2.5Y 7/4, or 5Y 6/1. Mottles when moist are few, fine, and distinct to many, medium, and

prominent and have color of 10YR 4/2 or 4/3; 2.5Y 4/2 or 7/4, 5Y 3/1, 4/1, or 6/1; or 5GY 5/1. Mottles that have chroma of 2 or less when moist are in most pedons. The Bt horizon is clay loam or clay. Some pedons have clay films. The electrical conductivity is 2 to 6 millimhos per centimeter. The exchangeable sodium percentage is 15 to 30. The horizon is slightly effervescent to violently effervescent. It is moderately alkaline or strongly alkaline

The Cca horizon has color of 10YR 7/3, 2.5Y 4/2 or 5/2, or 5Y 5/1 or 7/3. Moist color is 10YR 4/3, 5/4, or 6/4; 2.5Y 4/2, 4/4, 5/3, or 6/4; 5Y 3/1, 5/2, 5/3, or 6/3; or 5GY 5/1. In some pedons mottles are few, fine, and distinct and have color of 10YR 4/6 or 8/6 or of 5Y 7/1. Mottles when moist are common, medium, and prominent and have color of 7.5YR 3/2, 2.5Y 5/4 or 6/4, or 5Y 6/1. The Cca horizon is clay loam or clay. The electrical conductivity is 2 to 6 millimhos per centimeter, and the exchangeable sodium percentage is 8 to 15. The horizon is slightly effervescent to violently effervescent. It is moderately alkaline or strongly alkaline.

The IICsi horizon has color of 10YR 5/4, 6/3, 7/2, or 8/3; 2.5Y 6/4; or 5Y 4/1, 6/1, or 8/1. Moist color is 10YR 3/3, 5/3, 5/4, or 6/4; 2.5Y 5/4; 5Y 5/3 or 8/1; or 5B 4/1. Mottles are few, fine, and distinct to common, medium, and prominent and have color of 5Y 6/1 or 6/2. Mottles when moist are few, fine, and prominent to many, medium, and prominent and have color of 5Y 4/2 or 5GY 5/1. The matrix of the IICsi horizon is sandy clay loam or clay. The horizon is 20 to 80 percent durinodes that are 2 to 30 millimeters in diameter and are rounded or angular. The pan is more than 30 inches thick, is stratified with soil material, and extends to a depth of more than 90 inches. Artesian water flows through and under the pan.

Wekoda Series

The Wekoda series consists of very deep, poorly drained soils in the valley basin. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 2 percent.

Soils of the Wekoda series are fine, montmorillonitic, thermic Aquic Chromoxererts.

Typical pedon of Wekoda clay, partially drained, about 3.5 miles south of the city of Dos Palos; 450 feet west and 300 feet north of the southeast corner of sec. 20, T. 11 S., R. 12 E., Dos Palos Quadrangle.

Ap—0 to 5 inches; dark gray (5Y 4/1) clay, dark olive gray (5Y 3/2) moist; strong coarse and medium angular blocky structure; very hard, firm, sticky and very plastic; many very fine and common fine roots; few very fine tubular pores; moderately alkaline; clear smooth boundary.

A12—5 to 11 inches; dark gray (5Y 4/1) clay, dark olive gray (5Y 3/2) moist; common fine distinct yellowish brown (10YR 5/4 and 5/6) mottles; strong coarse and medium angular blocky structure; very hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; strong slickensides at bottom of horizon; slightly effervescent; disseminated lime; electrical conductivity is 3.4 millimhos per centimeter; exchangeable sodium percentage is 8; moderately alkaline; clear wavy boundary.

AC—11 to 14 inches; olive gray (5Y 4/2) clay, dark olive gray (5Y 3/2) and olive brown (2.5Y 4/4) moist; strong coarse and medium angular blocky structure; extremely hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; slickensides throughout horizon; slightly effervescent; disseminated lime; exchangeable sodium percentage is 7; moderately alkaline; abrupt wavy boundary.

C1—14 to 22 inches; olive (5Y 5/3) clay, olive brown (2.5Y 4/4) moist; strong coarse and medium angular blocky structure; extremely hard, firm, sticky and very plastic; no roots; few very fine tubular pores; slightly effervescent; lime is disseminated and is segregated as common medium irregular soft masses; electrical conductivity is 5.4 millimhos per centimeter; exchangeable sodium percentage is 6; moderately alkaline; clear wavy boundary.

C2—22 to 62 inches; olive (5Y 5/3) clay, olive brown (2.5Y 4/4) moist; massive; extremely hard, firm, sticky and very plastic; few very fine tubular pores; common small gypsum crystals; slightly effervescent; lime is disseminated and is segregated as few fine irregular soft masses; electrical conductivity is 7 millimhos per centimeter; exchangeable sodium percentage is 12; moderately alkaline.

The profile has cracks that are 1 centimeter wide at a depth of 25 inches. The cracks are 2 to 7 centimeters wide at the surface.

The A horizon has color of 2.5Y 5/2 or of 5Y 4/1 or 4/2. Moist color is 2.5Y 3/2 or 5Y 3/2. Clay content is 50 to 60 percent. Organic matter content is 1 to 3 percent. The electrical conductivity is less than 4 millimhos per centimeter. The A horizon is 10 to 18 inches thick.

The C horizon has color of 2.5Y 4/2 or 5/4 or of 5Y

4/2 or 5/3. Moist color is 2.5Y 3/2 or 4/4 or 5Y 3/2 or 4/3. Clay content is 45 to 60 percent. The electrical conductivity is 4 to 8 millimhos per centimeter. Some pedons have few to many seams of gypsum.

Wisflat Series

The Wisflat series consists of shallow, well drained soils on foothills. These soils formed in material weathered from sandstone or shale. Slope is 8 to 75 percent.

Soils of the Wisflat series are loamy, mixed (calcareous), thermic Lithic Xerorthents.

Typical pedon of a Wisflat sandy loam in an area of Wisflat-Rock outcrop-Arburua complex, 30 to 50 percent slopes, about 11 miles southwest of the city of Los Banos; 750 feet west and 700 feet north of the southeast corner of sec. 34, T. 11 S., R. 9 E., Ortigalita Peak Northwest Quadrangle.

A1—0 to 6 inches; pale yellow (2.5Y 7/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; strongly effervescent; disseminated lime; moderately alkaline; gradual smooth boundary.

C—6 to 14 inches; pale yellow (2.5Y 7/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores and many very fine interstitial pores; violently effervescent; disseminated lime; moderately alkaline; abrupt irregular boundary.

Cr—14 to 16 inches; strongly weathered and fractured sandstone; common very fine roots in fractures.

R—16 inches; slightly weathered sandstone.

The profile is 10 to 20 inches deep to a lithic contact; depth varies greatly within short distances. The profile is 5 to 18 percent clay.

The A horizon has color of 10YR 5/3, 5/4, 5/6, 6/2, 6/3, 6/4, 7/2, 7/3, or 7/4 or of 2.5Y 5/2, 5/4, 6/2, 6/4, 7/2, or 7/4. Moist color is 10YR 4/3, 4/4, or 5/4 or 2.5Y 4/4 or 5/4. The horizon is slightly effervescent to strongly effervescent. It is as much as 15 percent angular gravel and cobbles. Organic matter content is 0.5 to 1.0 percent.

The C horizon has color of 10YR 5/3, 6/3, 6/4, 7/2, 7/3, or 7/4 or of 2.5Y 6/2, 6/4, 7/2, or 7/4. Moist color is 10YR 4/4 or 5/4 or 2.5Y 4/4 or 5/4. The horizon is sandy loam, gravelly sandy loam, or loam. It is strongly effervescent or violently effervescent. It is 5 to 25 percent angular gravel and cobbles. The underlying sandstone or shale is soft, strongly weathered, and fractured for as many as 6 inches, and it becomes extremely hard with increasing depth. The fractures are as much as 1.5 inches wide and are filled with soil material and roots.

Woo Series

The Woo series consists of very deep, well drained soils on alluvial fans. These soils formed in mixed alluvium derived dominantly from sedimentary rock. Slope is 0 to 5 percent.

Soils of the Woo series are fine-loamy, mixed, thermic Calcic Haploxerolls.

Typical pedon of Woo clay loam, 0 to 2 percent slopes, about 5.7 miles south of the city of Los Banos; 1,300 feet north and 840 feet west of the southeast corner of sec. 15, T. 11 S., R. 10 E., Charleston School Quadrangle.

Ap1—0 to 5 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure and strong thick platy structure; hard, friable, sticky and plastic; few very fine roots; no pores; 1.1 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline; abrupt smooth boundary.

Ap2—5 to 10 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 1.2 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

A1—10 to 15 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine tubular pores; 1.1 percent organic matter; slightly effervescent; disseminated lime; moderately alkaline; clear smooth boundary.

ACca—15 to 22 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 3/3) moist; brown (10YR 5/3) stains on ped faces, very dark grayish brown (10YR 3/2) moist; strong medium prismatic and subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; few very fine and fine tubular pores; many moderately thick pressure faces; slightly effervescent; lime is disseminated and is segregated as few fine seams; 0.7 percent

organic matter; moderately alkaline; clear smooth boundary.

C2—22 to 30 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; no roots; few very fine, fine, and medium tubular pores; slightly effervescent; disseminated lime; 0.4 percent organic matter; moderately alkaline; clear wavy boundary.

C3—30 to 37 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine and medium tubular pores; strongly effervescent; disseminated lime; moderately alkaline; clear wavy boundary.

C4ca—37 to 65 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine and medium tubular pores; violently effervescent; lime is disseminated and is segregated as common fine threads and few fine soft masses; moderately alkaline.

These soils are well drained; however, areas that have a slowly permeable C horizon have become wet from applications of irrigation water.

The A horizon has color of 10YR 4/2, 4/3, 5/2, 5/3, or 5/4 or of 2.5Y 5/2. Moist color is 10YR 3/2 or 3/3 or 2.5Y 3/2. The horizon is loam, clay loam, sandy clay loam, or clay and is 18 to 45 percent clay. It is 11 to 19 inches thick. It is noneffervescent or slightly effervescent. Some pedons are as much as 10 percent gravel. Organic matter content is 1 to 2 percent. The horizon is neutral to moderately alkaline.

The C horizon has color of 10YR 5/4, 6/3, 6/4, 6/6, 6/8, 7/3, 7/4, 7/6, or 8/6; 2.5Y 5/4, 6/4, 6/6, 7/4, 7/6, or 8/6; or 5Y 7/4. Moist color is 10YR 3/2, 3/3, 3/4, 3/6, 4/3, 4/4, 4/6, 5/3, 5/4, 5/6, 5/8, 6/4, 6/6, or 7/4; 2.5Y 4/4, 5/4, 5/6, 6/4, or 7/4; or 5Y 6/3. Mottles, which occur only in wet areas, have color of 10YR 4/3, 5/3, or 6/8; 7.5YR 3/2, 3/4, 4/2, 4/6, or 5/6; 2.5Y 7/4; 5Y 5/1, 5/3, 6/1, or 6/3; 5GY 4/1, 5/1, 6/1, or 7/1; or N 2/0 or 3/0. Typically, the C horizon is clay loam, loam, sandy clay loam, sandy loam, silt loam, or silty clay loam and is 18 to 35 percent clay. In some pedons the lower part of the C horizon is clay loam or clay and is 35 to 45 percent clay or is stratified gravelly loamy sand to gravelly sandy loam and is 5 to 15 percent clay and 15 to 30 percent gravel. The C horizon is slightly effervescent or strongly effervescent. It is mildly alkaline or moderately alkaline.

Xerofluvents

The Xerofluvents consist of very deep, poorly drained to well drained soils in the valley basin, in channels, and on flood plains. These soils formed in stratified alluvium derived from various kinds of rock. Slope is 0 to 2 percent.

Reference pedon of Xerofluvents, channeled, about 6.8 miles northeast of the city of Dos Palos; 2,400 feet east and 500 feet north of the southwest corner of sec. 9, T. 10 S., R. 13 E., Santa Rita Bridge Quadrangle.

A1—0 to 5 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; few fine prominent yellowish brown (10YR 5/6) mottles, few fine distinct olive yellow (2.5Y 6/6) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and nonplastic; common very fine and fine roots; few very fine tubular pores; slightly acid; abrupt smooth boundary.

IIC1—5 to 12 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate thin platy structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; few very fine tubular pores; neutral; clear smooth boundary.

IIIC2—12 to 20 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; loose, nonsticky and nonplastic; few very fine and fine roots; neutral; abrupt smooth boundary.

IVC3—20 to 25 inches; light brownish gray (2.5YR 6/2) fine sand, dark grayish brown (2.5YR 4/2) moist; few fine prominent brownish yellow (10YR 6/6) mottles, yellowish brown (10YR 5/6) moist; single grain; loose, nonsticky and nonplastic; no roots; medium acid; abrupt smooth boundary.

VC4—25 to 60 inches; light brownish gray (2.5Y 6/2) very fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; slightly acid.

These soils are extremely variable in their characteristics. A water table fluctuates between depths of 24 and 72 inches in December through April. Colors are variable. Value when dry is 5 or more, and value when moist is 2, 3, or 4. Chroma is 2, 3, or 4. Most pedons have mottles in the profile. These soils are stratified coarse sand to clay and are 0 to 90 percent gravel and cobbles. Reaction is medium acid to moderately alkaline.

Yokut Series

The Yokut series consists of very deep, well drained soils on flood plains and in areas of alluvial fan overwash on terraces. These soils formed in mixed alluvium. Slope is 0 to 2 percent.

Soils of the Yokut series are loamy-skeletal, mixed, thermic Typic Haploxeralfs.

Typical pedon of Yokut sandy loam, about 4 miles west of the city of Gustine; 2,500 feet east and 1,200 feet north of the southwest corner of sec. 10, T. 8 S., R. 8 E., Howard Ranch Quadrangle.

Ap—0 to 6 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; strong fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine tubular pores; 1 percent gravel 2 to 5 millimeters in diameter; medium acid; abrupt smooth boundary.

A12—6 to 16 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine and fine tubular pores; 1 percent gravel 2 to 5 millimeters in diameter; slightly acid; clear wavy boundary.

IIB1t—16 to 21 inches; light yellowish brown (10YR 6/4) gravelly loam, strong brown (7.5YR 5/6) moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; few very fine and fine tubular pores; few thin clay films in pores; 25 percent gravel 2 to 5 millimeters and 20 to 75 millimeters in diameter; moderately alkaline; abrupt wavy boundary.

IIB21t—21 to 36 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, sticky and plastic; few very fine and fine roots; few very fine tubular pores; many moderately thick and thick clay films bridging sand grains and coating pebbles; 70 percent gravel 2 to 65 millimeters in diameter; moderately alkaline; diffuse smooth boundary.

IIB22t—36 to 68 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, sticky and plastic; no roots; few very fine tubular pores; many moderately thick and thick clay films bridging sand grains and coating pebbles; 70 percent gravel 2 to 75 millimeters in diameter; moderately alkaline.

Rock fragment content is 0 to 10 percent in the A horizon, 20 to 30 percent in the IIB1t horizon, and 65 to 80 percent in the IIB2t horizon.

The A horizon has color of 7.5YR 4/2, 4/4, or 5/6 or of 10YR 4/2, 4/3, 5/4, 6/3, or 6/4. Moist color is 7.5YR 3/2 or 3/4 or 10YR 3/2, 3/3, 3/4, 4/3, or 4/4. Some pedons are hard and massive when dry. The A horizon is sandy loam or loam in the upper part and loam or sandy clay loam in the lower part. It is 12 to 25 percent clay.

The IIBt horizon has color of 7.5YR 4/2, 4/4, 5/4, 5/6, or 6/4 or of 10YR 4/3, 4/4, 5/2, 5/4, or 6/4. Moist color is 7.5YR 3/2, 3/4, 4/4, 4/6, 5/4, or 5/6 or 10YR 3/2, 3/3, 3/4, 4/3, or 4/4. The horizon is extremely gravelly loam or extremely gravelly sandy clay loam and is 20 to 30 percent clay.

Formation of the Soils

By Paul W. Benedict, soil scientist, Soil Conservation Service.

Soil is a natural body on the surface of the Earth. It is composed of minerals, air, water, and organic matter, all of which occur in varying proportions. The formation of soil is a result of the interaction of five factors: (1) the physical and chemical composition of the parent material; (2) the climate; (3) the relief, or lay of the land; (4) the biological forces; and (5) the length of time the factors have been in operation. A wide variety of soil types have formed in this survey area.

Parent Material

Parent material is the weathered rock or unconsolidated (mixed) organic and mineral material in which soil forms. The hardness, grain size, and porosity of the parent material and its content of weatherable minerals greatly influence the formation of soils. In this survey area the soils formed in residual and alluvial material.

Most of the soils on the mountains in the Coast Range formed in residual material *(3, 4, 5, 6)*. There are two major geologic formations in the Coast Range—the Franciscan Formation, which extends the entire length of the western side of Merced County, and the Quien Sabe Formation, which occupies the area south of Pacheco Pass, along the San Benito County boundary. There is also the less extensive Peckham Formation of the intermountain valleys and terraces, which consists of alluvial material.

Examples of soils that developed on the Franciscan Formation are those of the Fifield, Honker, Millsholm, and Quinto series. These soils formed in parent material weathered from sandstone, graywacke, thin-bedded chert, siltstone, and other sedimentary and metamorphic rock.

Soils on the Quien Sabe Formation formed in parent material weathered from basalt, volcanic tuff conglomerate, andesitic flows, andesitic agglomerate, and other volcanic rock. The Ararat, Laveaga, and Peckham soils formed in this material.

Orognen and Quiensabe soils formed in parent material of the Peckham Formation. The alluvium that produced the Peckham Formation came from the surrounding Franciscan and Quien Sabe Formations.

The soils on the foothills in the Coast Range formed dominantly in material weathered from sandstone, shale, conglomerate, and other sedimentary rock. Much of the material is calcareous. The main geologic formations of these foothills are the Moreno and Panoche Formations. The Arburua, Ayar, Conosta, Oneil, and Wisflat soils are examples of those that formed on the foothills.

Old alluvial terraces, mostly on the Tulare and Oro Loma Formations, are throughout the foothills in the Coast Range and on the western edge of the San Joaquin Valley. The soils on the terraces are dominantly fine textured, and they formed in alluvium derived from sedimentary rock and various other kinds of rock. The Bapos, Damluis, and Los Banos soils formed on these terraces.

The soils of the San Joaquin Valley formed in alluvium that is younger than the alluvium of the terraces. These soils can be divided into two groups: (1) those in the valley basin, which occurs along the flood plain of the San Joaquin River; and (2) those on the alluvial fans, which extend from the foothills and terraces of the Coast Range to the valley basin rim.

The soils in the valley basin formed in mixed alluvium that is dominantly granitic and was transported from the Sierra Nevada Mountains by the San Joaquin River. The Agnal, Bolfar, Dospalos, Elnido, and Palazzo soils are examples. These soils have more mica and coarser grained sand particles than soils of the alluvial fans.

The soils on the alluvial fans formed dominantly in alluvium derived from sedimentary rock. The alluvium is from the foothills and mountains of the Coast Range. The Britto, Chateau, Deldota, Dosamigos, Marcuse, Pedcat, Stanislaus, Volta, and Woo soils are examples of those that formed in this material.

The Triangle and Turlock soils developed in alluvium derived from both granitic and sedimentary rock. These

soils are near the area where the valley basin and alluvial fans meet.

Climate

Climate has a marked influence on the kind of soil that forms in an area. The temperature and moisture and their relationship to each other influence the kinds and amount of vegetation, the rate of organic matter decomposition and other biological activities, the rate that minerals weather (both chemically and physically), and the removal or accumulation of material in different soil horizons.

The climate in this survey area is characterized by cool, moist winters and hot or warm, dry summers. By early in March the soils commonly are moist to a depth of several feet, and by late in August the soils in nonirrigated areas are completely dry. Weather fronts that move through the area produce 8 to 14 inches of rainfall annually in the San Joaquin Valley and the foothills of the Coast Range, and they produce 13 to 24 inches of rainfall or snowfall annually in the mountains of the Coast Range. Some of the mountains along the western edge of the survey area also have coastal fog in summer. The average annual temperature ranges from 59 degrees F at the higher elevations in the mountains to 63 degrees in the San Joaquin Valley.

The effects of increased precipitation can be seen from the San Joaquin Valley, through the foothills, and into the mountains. As precipitation increases, oak-grass woodland gradually replaces the annual grasses and forbs of the valley and foothills, particularly on north-facing mountainsides, where the angle of the sun allows the soils to stay moist for a longer period of time. These moist, more densely vegetated soils have higher organic matter content and exhibit more biological activity.

Precipitation also leaches out bases (salts) as it drains through the soil. This causes the soil to become more acidic. If a significant amount of leaching takes place, the fertility of the soil declines. Soils on the mountains receive more precipitation than do soils on the foothills and in the valley and generally are more acidic. The B horizon of the Stanislaus soils, which are on the alluvial fans, is mildly alkaline or strongly alkaline, while the B horizon of the Fifield soils, which are on the mountains, is strongly acid to slightly acid.

Relief

Relief influences soil formation through its effect on drainage, runoff, and exposure to sun and wind.

The relief of this survey area is mainly the result of past geologic activity. Major differences in the relief of the area can best be shown by describing the four prominent physiographic units: (1) the mountains of the Coast Range; (2) the foothills of the Coast Range; (3) the terraces on the western edge of the San Joaquin Valley; and (4) the alluvial fans and valley basin of the San Joaquin Valley.

Many of the soils in the valley basin and lower alluvial fans are saline or saline-sodic. Sediment and dissolved salts accumulate as a result of the runoff water from weathered rock and eroding soils in the Sierra Nevada Mountains and the Coast Range. The sediment and dissolved salts are deposited by floodwater onto the soils of the alluvial fans and the valley basin. Evapotranspiration and restricted subsurface drainage promote the accumulation of salts and sodium in these soils. The Agnal and Turlock soils are examples.

Before the development of canals, levees, and dams in the San Joaquin Valley, the valley basin and alluvial fans received much more new alluvial material than they do presently. This material was eroded from the mountains and foothills of the Coast Range or was deposited by the San Joaquin River during periods of flooding. The Quinto, Romero, San Luis, Los Banos, and Laguna Seca Creeks are the major drainageways in the Coast Range that drain into the valley. The Dosamigos, Stanislaus, and Woo soils formed in this alluvium.

The soils on the terraces formed in old alluvium that has been dissected by creeks flowing from the Coast Range. The terraces no longer receive new alluvial material because of their present higher position and the deepened drainageways. The Bapos, Damluis, and Los Banos soils are examples of those on terraces.

The foothills and mountains of the Coast Range are undergoing natural and accelerated erosion, which is a result of runoff from the sloping topography. The soils that have steep, very steep, and extremely steep slopes have a rapid or very rapid rate of runoff, which results in a high rate of erosion. Other factors, such as the erodibility of the soil, the vegetation, and the intensity of storms also affect the rate of erosion. Because of this erosion, the soils on slopes of the foothills and mountains generally are less than 60 inches deep to bedrock. Examples are the Wisflat soils, which have bedrock at a depth of 10 to 20 inches, and the Laveaga soils, which have soft bedrock at a depth of 40 to 60 inches.

Aspect also influences soil development. South-facing slopes receive more heat from the sun than do

north-facing slopes. The soils on south aspects are warmer and dry out faster in spring. As a result, vegetat on is not as abundant on south-facing soils, such as those of the Honker series, as it is on north-facing soils, sucn as those of the Gonzaga series.

Biological Activity

Vegetation, burrowing animals, insects, earthworms, and micro-organisms are important in the formation of soils. They contribute to the accumulation and decomposition of organic matter, the consumption and release of plant nutrients, and the changes in soil structure and porosity.

Rodents, earthworms, and micro-organisms mix organic matter into the soil and help to break down plant and animal residue, which improve water and air movement through the soil. Bacteria, fungi, algae, actinomycetes, and other micro-organisms help to weather the rock and mineral portions of the soil and also produce humus through decomposition of organic matter. This decomposition and the metabolism of living plants produce acids that accelerate the weathering of soil materia . Plant litter on the surface insulates the soil against heat and cold and reduces the rate of evaporation, thereby increasing the length of time that microbial activity can take place.

Time

The extent of the alteration of parent material by the interaction of climate, biological activity, and relief is influenced by the length of time these factors have acted upon the soils.

In general, the degree of differentiation between soi horizons is related to the age of the soil. Distinct boundaries between horizons generally are characteristic of older soils. Soils that have little or no horizon development are considered to be young. It is important to remember, however, that a soil that has the strongest horizon development is not necessarily the oldest in the sense of time. A strong influence by some other factor, such as precipitation, can speed up or slow down the process of development.

The soils in the survey area range from young soils on the recent alluvial fans and actively eroding foothills to older soils on the nigh terraces. Older soils, such as those of the Bapos and Orognen series, have a very slowly permeable B horizon because of an accumulation of clay particles over long periods of time. Younger soils, such as those of the Woo series, exhibit little development.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10
Very high	More than 10

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition of woody vegetation to allow understory grasses and forbs to recover, or to make conditions favorable for reseeding. It increases production of forage, which reduces erosion. Brush management may improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation by use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both,

moved by creep, slide, or local wash and deposited at the base of steep slopes.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. If soil improving crops and practices used in the system more than offset the soil depleting crops and deteriorating practices, then it is a good conservation cropping system. Cropping systems are needed on all tilled soils. Soil improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops using a planned system of rotation and management practices.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and low water holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and low water holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have intermediate

water holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless artificial drainage is provided. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or ong enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low nydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. They are wet enough to prevent the growth of important crops (except rice) unless art ficially drained.

Drainage, surface. Runoff, or surface flow of water, from an area.

Duff. A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, f re, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants. Commonly more than 15 percent calcium carbonate equivalent.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (or 300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from crop and.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Guzzler. A permanent, self-filling water catchment for wildlife.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	Very low
0.2 to 0.4	Low
0.4 to 0.75	Moderately low
0.75 to 1.25	Moderate
1.25 to 1.75	Moderately high
1.75 to 2.5	High
More than 2.5	Very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Load supporting capacity. The ability of a soil to bear a load as compared to that of standard crushed limestone.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and

low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color in hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Partially drained soil. Refers to a soil that is artificially drained and has a water table at a depth of less than 5 feet.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	Less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	More than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed. (See climax plant community.)

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content

of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This increases the vigor and reproduction of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity, in pH, is expressed as—

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline-sodic soil. A soil containing enough soluble salts to be a saline soil and enough exchangeable sodium to be a sodic soil.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfal and runoff water.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form s called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickens des may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in mo sture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the follow ng slope classes, by percentage, are recognized:

Nearly level	0 to 2
Gently sloping	2 to 5
Moderately sloping	5 to 9
Strongly sloping	9 to 15
Moderately steep	15 to 30
Steep	30 to 50
Very steep	50 to 75
Extremely steep	More than 75

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity, expressed in SAR, are—

Slight	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

Soft rock. Rock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the Earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeter in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of

the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below the A horizon.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--MEAN TEMPERATURE AND PRECIPITATION

(Data recorded by the National Oceanic and Atmospheric Administration)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
LOS BANOS*													
Temperature (^{o}F)------	45.4	50.5	54.5	60.3	66.3	72.2	79.6	76.7	72.9	64.0	53.4	46.2	61.8
Precipitation (inches)	1.58	1.48	1.18	0.97	0.30	0.03	0.01	0.01	0.16	0.53	1.16	1.49	8.9
NEWMAN*													
Temperature (^{o}F)------	45.5	50.6	54.9	60.7	67.0**	73.2	78.2**	76	72.4	64.3	53.7	46.0	61.9
Precipitation (inches)	2.09	1.85	1.39	1.16	0.31	0.05	0.01	0.02	0.12	0.48	1.37	1.82	10.67
LOS BANOS ARBURUA RANCH*													
Precipitation (inches)	1.34	1.04	2.48	1.49	T	0	T	0	T	0.52	2.22	0.60	9.69
STAYTON MINE***													
Precipitation (inches)	4.86	3.79	2.83	2.38	0.89	0.13	0	0	0.61	0.87	1.72	5.05	23.13

* Data are from records for 1981.
** Data are from records for 1980.
*** Data are from records for 1960.
T means trace.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
101	Agnal clay loam	4,790	0.8
102	Akad-Conosta association, 30 to 50 percent slopes	3,090	0.5
103	Alros clay loam, partially drained	10,980	1.8
104	Alros clay loam	1,090	0.2
105	Altamont Variant-Hytop complex, 30 to 50 percent slopes	1,460	0.2
106	Anela gravelly loam, 0 to 2 percent slopes	1,430	0.2
107	Anela very gravelly sandy loam, 2 to 8 percent slopes	630	0.1
108	Anela very gravelly sandy loam, 8 to 15 percent slopes	450	0.1
109	Apollo clay loam, 2 to 8 percent slopes	4,130	0.7
110	Apollo clay loam, 8 to 15 percent slopes	1,550	0.3
111	Apollo clay loam, 15 to 30 percent slopes	690	0.1
112	Ararat extremely stony loam, 5 to 30 percent slopes	530	0.1
113	Ararat-Gonzaga complex, 30 to 50 percent slopes	400	0.1
114	Ararat-Peckham complex, 8 to 30 percent slopes	4,020	0.7
115	Ararat-Peckham complex, 30 to 50 percent slopes	3,610	0.6
116	Arbuckle Variant sandy loam	700	0.1
117	Arburua loam, 2 to 8 percent slopes	2,020	0.3
118	Arburua loam, 8 to 15 percent slopes	3,720	0.6
119	Arburua loam, 15 to 30 percent slopes	10,370	1.7
120	Arburua loam, 30 to 50 percent slopes	11,370	1.9
121	Asolt very stony clay, 15 to 30 percent slopes	480	0.1
122	Asolt very stony clay, 30 to 50 percent slopes	1,420	0.2
123	Ayar clay, 5 to 8 percent slopes	1,700	0.3
124	Ayar clay, 8 to 15 percent slopes	600	0.1
125	Ayar clay, 15 to 30 percent slopes	910	0.1
126	Ayar clay, 30 to 50 percent slopes	1,830	0.3
127	Ayar-Arburua complex, 8 to 15 percent slopes	840	0.1
128	Ayar-Arburua complex, 15 to 30 percent slopes	2,600	0.4
129	Ayar-Arburua complex, 30 to 50 percent slopes	500	0.1
130	Ayar-Oneil complex, 30 to 50 percent slopes	1,670	0.3
131	Ballvar loam, 2 to 8 percent slopes	3,020	0.5
132	Ballvar-Pedcat, eroded association, 0 to 5 percent slopes	480	0.1
133	Bapos sandy clay loam, 0 to 2 percent slopes	1,040	0.2
134	Bapos clay loam, 2 to 8 percent slopes	7,500	1.2
135	Bapos clay loam, 8 to 15 percent slopes	890	0.1
136	Bapos-Arburua complex, 8 to 15 percent slopes	600	0.1
137	Bisgani loamy sand, partially drained	2,040	0.3
138	Bisgani clay loam, occasionally flooded	610	0.1
139	Bolfar clay loam, partially drained	19,600	3.2
140	Bolfar clay loam, hummocky	1,310	0.2
141	Britto clay loam	4,120	0.7
142	Britto clay loam, leveled	2,840	0.5
143	Britto clay loam, ponded	4,800	0.8
144	Capay clay loam	600	0.1
145	Capay clay	1,360	0.2
146	Carranza gravelly loam, 0 to 2 percent slopes	200	*
147	Carranza gravelly clay loam, 2 to 8 percent slopes	2,120	0.3
148	Carranza-Woo complex, 0 to 2 percent slopes	1,730	0.3
149	Chaqua loam, 2 to 8 percent slopes	1,320	0.2
150	Chateau clay, partially drained	5,750	0.9
151	Chateau clay, ponded	2,060	0.3
152	Checker loam	1,810	0.3
153	Chinvar loam	2,950	0.5
154	Cole Variant clay loam, 2 to 5 percent slopes	240	*
155	Conosta clay loam, 2 to 8 percent slopes	1,700	0.3
156	Conosta clay loam, 8 to 15 percent slopes	1,500	0.2
157	Conosta clay loam, 15 to 30 percent slopes	1,670	0.3
158	Conosta-Arburua complex, 15 to 30 percent slopes	630	0.1
159	Contra Costa loam, 30 to 50 percent slopes	3,420	0.6
160	Contra Costa loam, 50 to 65 percent slopes	2,070	0.3
161	Damluis clay loam, 0 to 2 percent slopes	4,260	0.7
162	Damluis clay loam, 2 to 8 percent slopes	4,730	0.8
163	Damluis gravelly clay loam, 0 to 2 percent slopes	450	0.1

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
164	Damluis gravelly clay loam, 2 to 8 percent slopes	660	0.1
165	Damluis gravelly clay loam, 8 to 15 percent slopes	340	0.1
166	Damluis Variant clay loam	660	0.1
167	Deldota clay, partially drained	7,900	1.3
168	Dosamigos clay loam, partially drained	7,500	1.2
169	Dosamigos clay, partially drained	3,820	0.6
170	Dospalos clay loam, partially drained	14,560	2.4
171	Dospalos clay, partially drained	12,950	2.1
172	Dospalos clay, hummocky	1,970	0.3
173	Dospalos-Bolfar complex, occasionally flooded	1,630	0.3
174	Dospalos-Urban land complex, partially drained	360	0.1
175	Edminster loam	4,570	0.7
176	Edminster-Kesterson complex	3,300	0.5
177	Edminster Variant sand	600	0.1
178	Elnido sandy loam, partially drained	5,850	1.0
179	Elnido sandy loam, wet	1,320	0.2
180	Elnido clay loam, partially drained	3,880	0.6
181	Escano clay loam, partially drained	2,900	0.5
182	Fifield sandy loam, 50 to 65 percent slopes	1,120	0.2
183	Fifield-Gonzaga complex, 30 to 50 percent slopes	6,500	1.1
184	Fifield-Honker-Gonzaga complex, 50 to 65 percent slopes	2,730	0.4
185	Fifield-Millsholm complex, 30 to 50 percent slopes	4,510	0.7
186	Fluvaquents, channeled	2,530	0.4
187	Franciscan sandy loam, 50 to 70 percent slopes	2,850	0.5
188	Franciscan-Quinto-Honker complex, 50 to 75 percent slopes	10,760	1.8
189	Franciscan-Rock outcrop complex, 30 to 50 percent slopes	3,300	0.5
190	Gonzaga-Honker complex, 30 to 50 percent slopes	2,350	0.4
191	Gonzaga-Honker complex, 50 to 65 percent slopes	870	0.1
192	Henmel clay loam, partially drained	2,240	0.4
193	Herito loam	1,590	0.3
194	Honker sandy loam, 30 to 50 percent slopes	2,260	0.4
195	Honker sandy loam, 50 to 65 percent slopes	600	0.1
196	Honker-Millsholm-Rock outcrop complex, 30 to 50 percent slopes	3,250	0.5
197	Honker-Quinto complex, 30 to 50 percent slopes	970	0.2
198	Kesterson sandy loam	1,490	0.2
199	Kesterson sandy loam, ponded	590	0.1
200	Kesterson loam, ponded	1,280	0.2
201	Kesterson-Edminster complex	700	0.1
202	Laveaga-Lecrag complex, 30 to 50 percent slope	2,000	0.3
203	Laveaga-Lecrag complex, 50 to 75 percent slopes	1,040	0.2
204	Laveaga complex, 30 to 50 percent slopes	900	0.1
205	Laveaga-Hytop complex, 50 to 65 percent slopes	2,020	0.3
206	Los Banos clay loam, 0 to 2 percent slopes	470	0.1
207	Los Banos clay loam, 2 to 8 percent slopes	6,550	1.1
208	Los Banos clay loam, 8 to 15 percent slopes	740	0.1
209	Los Banos-Pleito clay loams, 2 to 8 percent slopes	340	0.1
210	Los Banos Variant gravelly sandy clay loam	560	0.1
211	Marcuse silty clay	560	0.1
212	Marcuse clay, leveled	3,110	0.5
213	Millsholm loam, 8 to 15 percent slopes	560	0.1
214	Millsholm loam, 30 to 50 percent slopes	8,720	1.4
215	Millsholm loam, 50 to 65 percent slopes	5,210	0.9
216	Millsholm-Fifield complex, 30 to 50 percent slopes	610	0.1
217	Millsholm-Honker-Rock outcrop complex, 30 to 50 percent slopes	4,740	0.8
218	Millsholm-Rock outcrop complex, 15 to 30 percent slopes	1,570	0.3
219	Millsholm-Rock outcrop complex, 30 to 50 percent slopes	2,300	0.4
220	Mollic Xerofluvents, channeled	3,000	0.5
221	Oneil silt loam, 8 to 15 percent slopes	850	0.1
222	Oneil silt loam, 15 to 30 percent slope	5,880	1.0
223	Oneil silt loam, 30 to 50 percent slopes	16,190	2.7
224	Oquin fine sandy loam, 2 to 8 percent slopes	220	*
225	Oquin fine sandy loam, 15 to 30 percent slopes	1,350	0.2
226	Orognen sandy loam, 2 to 5 percent slopes	490	0.1

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
227	Orognen-Quiensabe complex, 30 to 50 percent slopes	4,390	0.7
228	Palazzo sandy loam, partially drained	5,430	0.9
229	Paver clay loam, 0 to 2 percent slopes	2,340	0.4
230	Paver clay loam, 2 to 5 percent slopes	540	0.1
231	Peckham cobbly loam, 2 to 5 percent slopes	530	0.1
232	Peckham cobbly loam, 5 to 15 percent slopes	1,020	0.2
233	Peckham-Cole Variant association, 2 to 30 percent slopes	880	0.1
234	Pedcat loam, 0 to 2 percent slopes	4,800	0.8
235	Pedcat loam, 0 to 2 percent slopes, eroded	1,270	0.2
236	Pedcat clay loam, leveled, 0 to 2 percent slopes	11,540	1.9
237	Pedcat clay, 0 to 2 percent slopes, severely eroded	1,280	0.2
238	Pits	510	0.1
239	Pleito gravelly clay loam, 8 to 15 percent slopes	620	0.1
240	Pleito gravelly clay loam, 15 to 30 percent slopes	1,280	0.2
241	Quinto-Illito-Rock outcrop complex, 30 to 50 percent slopes	1,920	0.3
242	Quinto-Millsholm-Rock outcrop complex, 40 to 75 percent slopes	14,290	2.3
243	Quinto-Rock outcrop complex, 50 to 75 percent slopes	5,800	1.0
244	Rock outcrop-Ararat-Illito complex, 30 to 75 percent slopes	4,560	0.7
245	Rock outcrop-Wisflat complex, 30 to 75 percent slopes	3,510	0.6
246	San Emigdio fine sandy loam	610	0.1
247	San Emigdio loam	450	0.1
248	Santanela loam	2,680	0.4
249	San Timoteo sandy loam, 2 to 8 prcent slopes	650	0.1
250	San Timoteo-Wisflat sandy loams complex, 8 to 15 percent slopes	1,110	0.2
251	San Timoteo-Wisflat sandy loams complex, 15 to 30 percent slopes	520	0.1
252	Sehorn-Contra Costa complex, 30 to 50 percent slopes	1,470	0.2
253	Stanislaus clay loam	15,820	2.6
254	Stanislaus clay loam, wet	3,990	0.7
255	Stanislaus-Dosamigos-Urban land complex	1,650	0.3
256	Triangle clay	13,690	2.2
257	Triangle clay, sodic	15,190	2.5
258	Trulae silty clay, partially drained	1,770	0.3
259	Tunehill-Quiensabe complex, 30 to 50 percent slopes	2,850	0.5
260	Turlock sandy loam	17,250	2.8
261	Turlock loam, leveled	760	0.1
262	Turmound sandy loam	1,040	0.2
263	Vernalis loam, 2 to 5 percent slopes	1,210	0.2
264	Vernalis-Pedcat, eroded complex, 2 to 5 percent slopes	1,430	0.2
265	Volta clay loam	2,520	0.4
266	Volta clay loam, partially drained	1,560	0.3
267	Wekoda clay, partially drained	1,810	0.3
268	Wisflat-Arburua complex, 15 to 30 percent slopes	1,000	0.2
269	Wisflat-Arburua complex, 30 to 50 percent slopes	1,700	0.3
270	Wisflat-Rock outcrop-Arburua complex, 15 to 30 percent slopes	2,830	0.5
271	Wisflat-Rock outcrop-Arburua complex, 30 to 50 percent slopes	9,450	1.5
272	Wisflat-Rock outcrop-Arburua complex, 50 to 75 percent slopes	5,790	0.9
273	Wisflat-Rock outcrop-Oneil complex, 30 to 50 percent slopes	1,990	0.3
274	Woo loam, 0 to 2 percent slopes	7,030	1.2
275	Woo loam, gravelly substratum, 0 to 2 percent slopes	1,230	0.2
276	Woo sandy clay loam, 0 to 2 percent slopes	1,240	0.2
277	Woo clay loam, 0 to 2 percent slopes	18,990	3.1
278	Woo clay loam, 2 to 5 percent slopes	210	*
279	Woo clay loam, wet, 0 to 2 percent slopes	3,470	0.6
280	Woo clay, 0 to 2 percent slopes	5,800	1.0
281	Woo-Anela-Urban land complex, 0 to 2 percent slopes	240	*
282	Woo-Urban land complex, 0 to 2 percent slopes	590	0.1
283	Xerofluvents, channeled	2,290	0.4
284	Xerofluvents, extremely gravelly	1,980	0.3
285	Yokut sandy loam	770	0.1
286	Yokut loam	1,210	0.2
	Water	19,230	3.2
	Total	609,820	100.0

* Less than 0.1 percent.

TABLE 3A.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to crops and pasture are listed)

Soil name and map symbol	Alfalfa hay	Almonds	Apricots	Barley	Dry beans	Cantaloup	Cotton lint
	Tons	Lbs	Tons	Bu	Bu	Crates	Lbs
103 Alros	---	---	---	50	---	---	750
106 Anela	6.0	1,200	---	---	---	---	---
107 Anela	6.0	1,200	---	---	---	---	---
109 Apollo	---	---	---	60	---	---	800
110 Apollo	---	---	---	60	---	---	800
116 Arbuckle Variant	7.0	---	---	---	---	---	---
133 Bapos	6.0	---	---	---	---	---	900
137 Bisgani	6.0	---	---	55	---	---	1,000
139 Bolfar	8.0	---	---	75	---	220	1,500
142 Britto	5.0	---	---	50	---	---	---
144, 145 Capay	7.0	---	---	60	---	---	---
148 Carranza-Woo	---	---	7.0	---	---	200	900
149 Chaqua	---	---	---	---	---	---	1,000
150 Chateau	---	---	---	70	---	190	1,100
153 Chinvar	6.0	---	---	---	---	---	---
161 Damluis	6.0	---	---	60	30	---	990
162 Damluis	6.0	---	---	---	30	---	---
163 Damluis	6.0	1,400	---	---	---	---	950
164 Damluis	6.0	---	---	60	30	---	---

TABLE 3A.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Almonds	Apricots	Barley	Dry beans	Cantaloup	Cotton lint
	Tons	Lbs	Tons	Bu	Bu	Crates	Lbs
166----- Damluis Variant	---	---	---	60	---	---	---
167----- Deldota	7.0	---	---	---	---	160	1,200
168, 169----- Dosamigos	7.0	---	---	---	---	180	1,000
170----- Dospalos	7.0	---	---	60	---	180	1,200
171----- Dospalos	6.0	---	---	50	---	160	950
178----- Elnido	8.0	---	---	60	---	180	1,200
180----- Elnido	8.0	---	---	60	---	180	1,200
181----- Escano	8.0	---	---	65	---	170	1,200
192----- Henmel	6.5	---	---	55	---	---	880
206----- Los Banos	---	---	---	---	---	---	750
207----- Los Banos	---	---	---	---	---	---	750
208----- Los Banos	---	---	---	---	---	---	750
210----- Los Banos Variant	8.0	1,400	6.0	---	---	---	900
212----- Marcuse	---	---	---	50	---	---	---
228----- Palazzo	7.0	---	---	65	---	---	1,200
229----- Paver	---	1,500	6.7	---	---	250	1,000
230----- Paver	---	1,500	6.7	---	---	---	990
236----- Pedcat	6.0	---	---	55	---	---	---
247----- San Emigdio	8.0	1,500	---	---	35	---	---
253----- Stanislaus	7.0	---	---	60	30	180	900
254----- Stanislaus	7.0	---	---	---	30	---	900

TABLE 3A.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Almonds	Apricots	Barley	Dry beans	Cantaloup	Cotton lint
	Tons	Lbs	Tons	Bu	Bu	Crates	Lbs
258: Trulae	5.0	---	---	---	---	---	---
266: Volta	6.0	---	---	---	---	---	---
267: Wekoda	---	---	---	---	---	---	900
274: Woo	8.0	---	---	---	33	---	980
275: Woo	8.0	1,500	6.7	---	---	200	900
276: Woo	---	1,500	6.7	---	---	200	900
277: Woo	8.0	1,500	9.6	---	33	250	980
278: Woo	---	---	9.6	---	---	250	980
279: Woo	8.0	---	---	---	35	---	950
280: Woo	8.0	1,500	7.2	---	---	220	1,000
285: Yokut	6.0	1,200	---	---	---	250	---

TABLE 3B.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to the crops and pasture are listed)

Soil name and map symbol	Corn	Corn silage	Pasture	Green peas	Sugar beets	Tomatoes	Walnuts
	Bu	Tons	AUM*	Tons	Tons	Tons	Tons
103, 104 Alros	---	---	12	---	28	---	---
109 Apollo	---	---	---	---	30	---	---
110 Apollo	---	---	---	---	30	---	---
116 Arbuckle Variant	---	25	15	---	30	---	---
133 Bapos	---	---	14	---	20	---	---
137 Bisgani	128	---	---	---	25	18	---
139 Bolfar	165	---	---	---	35	30	---
144, 145 Capay	130	---	---	---	28	28	---
150 Chateau	---	---	12	---	28	---	---
161 Damluis	---	---	---	---	25	25	1.2
162 Damluis	---	---	---	---	25	25	1.2
163 Damluis	---	---	---	---	20	20	1.2
164 Damluis	---	---	---	---	25	---	1.2
166 Damluis Variant	---	---	---	---	25	25	---
167 Deldota	100	---	---	2.0	28	25	---
168, 169 Dosamigos	---	25	---	2.5	30	---	---
170 Dospalos	142	25	---	---	30	28	---
171 Dospalos	130	25	---	---	25	22	---

See footnote at end of table.

TABLE 3B.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Pasture	Green peas	Sugar beets	Tomatoes	Walnuts
	Bu	Tons	AUM*	Tons	Tons	Tons	Tons
178----------------------- Elnido	160	---	---	---	32	25	---
180----------------------- Elnido	160	---	---	---	32	25	---
181----------------------- Escano	160	---	---	---	32	25	---
192----------------------- Henmel	---	---	12	---	---	---	---
206----------------------- Los Banos	---	---	---	---	30	---	---
207----------------------- Los Banos	---	---	---	---	25	---	---
208----------------------- Los Banos	---	---	---	---	25	---	---
210----------------------- Los Banos Variant	---	25	---	---	30	---	---
212----------------------- Marcuse	---	---	12	---	---	---	---
228----------------------- Palazzo	143	---	---	---	30	28	---
229----------------------- Paver	---	25	---	---	---	30	2.0
230----------------------- Paver	---	---	---	---	---	---	2.0
236----------------------- Pedcat	---	17	10	---	22	---	---
247----------------------- San Emigdio	---	---	---	2.5	---	25	2.3
253----------------------- Stanislaus	---	25	---	2.1	28	25	2.5
254----------------------- Stanislaus	---	25	---	---	---	---	1.5
258----------------------- Trulae	---	---	---	---	12	---	---
263----------------------- Vernalis-Pedcat	---	---	---	---	---	---	2.0
266----------------------- Volta	---	18	---	---	20	---	---
267----------------------- Wekoda	---	---	---	---	20	---	---

See footnote at end of table.

TABLE 3B.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Pasture	Green peas	Sugar beets	Tomatoes	Walnuts
	Bu	Tons	AUM*	Tons	Tons	Tons	Tons
274------------------------ Woo	---	25	---	---	---	25	2.0
275------------------------ Woo	---	---	---	---	---	23	1.0
277------------------------ Woo	---	---	---	---	---	25	2.0
278------------------------ Woo	---	---	---	---	---	25	---
279------------------------ Woo	---	25	14	---	---	25	1.5
280------------------------ Woo	---	25	---	---	26	25	2.0
285------------------------ Yokut	---	15	12	---	18	---	1.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 4.--STORIE INDEX RATING

(Absence of an entry indicates that the map unit as a whole or the individual components were not rated)

Map symbol	Soil name	Rating factors A	Rating factors B	Rating factors C	Rating factors X	Index	Grade	Limitation in X factor
101	Agnal clay loam	80	60	100	20x10	1	6	Drainage, erosion, salinity and sodicity.
102	Akad-Conosta association, 30 to 50 percent slopes	---	---	---	---	14*	5	
	Akad part	40	80	35	100	---	---	None.
	Conosta part	56	85	35	100	---	---	None.
103	Alros clay loam, partially drained	90	85	100	80x60	37	4	Drainage, salinity and sodicity.
104	Alros clay loam	90	85	100	60x50	23	4	Drainage, salinity and sodicity.
105	Altamont Variant-Hytop complex, 30 to 50 percent slopes	---	---	---	---	11*	5	
	Altamont Variant	70	55	35	100	---	---	None.
	Hytop part	25	95	35	100	---	---	None.
106	Anela gravelly loam, 0 to 2 percent slopes	80	70	100	100	56	3	None.
107	Anela very gravelly sandy loam, 2 to 8 percent slopes	80	50	93	95	35	4	Fertility.
108	Anela very gravelly sandy loam, 8 to 15 percent slopes	80	50	80	95	30	4	Fertility.
109	Apollo clay loam, 2 to 8 percent slopes	85	85	93	90	60	2	Erosion.
110	Apollo clay loam, 8 to 15 percent slopes	85	85	80	90	52	3	Erosion.
111	Apollo clay loam, 15 to 30 percent slopes	85	85	65	90	42	3	Erosion.
112	Ararat extremely stony loam, 5 to 30 percent slopes	60	40	70	100	17	5	None.
113	Ararat-Gonzaga complex, 30 to 50 percent slopes	---	---	---	---	9*	6	
	Ararat part	60	40	35	100	---	---	None.
	Gonzaga part	40	100	35	100	---	---	None.
114	Ararat-Peckham complex, 8 to 30 percent slopes	---	---	---	---	18*	5	
	Ararat part	60	40	70	100	---	---	None.
	Peckham part	40	70	70	100	---	---	None.
115	Ararat-Peckham complex, 30 to 50 percent slopes	---	---	---	---	9*	6	
	Ararat part	60	40	35	100	---	---	None.
	Peckham part	40	70	35	100	---	---	None.
116	Arbuckle Variant sandy loam	85	95	100	95	77	2	Fertility.
117	Arburua loam, 2 to 8 percent slopes	60	100	93	90	50	3	Erosion.
118	Arburua loam, 8 to 15 percent slopes	60	100	80	90	43	3	Erosion.
119	Arburua loam, 15 to 30 percent slopes	60	100	65	90	35	4	Erosion.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
120	Arburua loam, 30 to 50 percent slopes	60	100	35	90	19	5	Erosion.
121	Asolt very stony clay, 15 to 30 percent slopes	70	30	65	100	14	5	None.
122	Asolt very stony clay, 30 to 50 percent slopes	70	20	35	100	5	6	None.
123	Ayar clay, 5 to 8 percent slopes	80	60	90	100	43	3	None.
124	Ayar clay, 8 to 15 percent slopes	80	60	80	100	38	4	None.
125	Ayar clay, 15 to 30 percent slopes	80	60	65	100	31	4	None.
126	Ayar clay, 30 to 50 percent slopes	80	60	35	100	17	5	None.
127	Ayar-Arburua complex, 8 to 15 percent slopes	---	---	---	---	40*	3	
	Ayar part	80	60	80	100	---	---	None.
	Arburua part	60	100	80	90	---	---	Erosion.
128	Ayar-Arburua complex, 15 to 30 percent slopes	---	---	---	---	33*	4	
	Ayar part	80	60	65	100	---	---	None.
	Arburua part	60	100	65	90	---	---	Erosion.
129	Ayar-Arburua complex, 30 to 50 percent slopes	---	---	---	---	18*	5	
	Ayar part	80	60	35	100	---	---	None.
	Arburua part	60	100	35	90	---	---	Erosion.
130	Ayar-Oneil complex, 30 to 50 percent slopes	---	---	---	---	18*	5	
	Ayar part	80	60	35	100	---	---	None.
	Oneil part	60	100	35	90	---	---	Erosion.
131	Ballvar loam, 2 to 8 percent slopes	95	100	93	100	88	1	None.
132	Ballvar-Pedcat, eroded association, 0 to 5 percent slopes	---	---	---	---	63*	2	
	Ballvar part	95	100	95	100	---	---	None.
	Pedcat part	40	85	100	60x 50x90	---	---	Drainage, salinity and sodicity, erosion.
133	Bapos sandy clay loam, 0 to 2 percent slopes	40	80	100	90	29	4	Fertility.
134	Bapos clay loam, 2 to 8 percent slopes	40	85	93	100	33	4	None.
135	Bapos clay loam, 8 to 15 percent slopes	40	85	80	100	27	4	None.
136	Bapos-Arburua complex, 8 to 15 percent slopes	---	---	---	---	34*	4	
	Bapos part	40	85	80	100	---	---	None.
	Arburua part	60	100	80	90	---	---	Erosion.
137	Bisgani loamy sand, partially drained	85	80	100	80	54	3	Drainage.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
138	Bisgani clay loam, occasionally flooded	85	85	100	60x90	39	4	Drainage and flooding, microrelief.
139	Bolfar clay loam, partially drained	95	85	100	80	65	2	Drainage.
140	Bolfar clay loam, hummocky	95	85	100	70x90	51	3	Drainage, microrelief.
141	Britto clay loam	40	85	100	40x 40x90	5	6	Drainage and flooding, salinity and sodicity, microrelief.
142	Britto clay loam, leveled	40	85	100	60x40	8	6	Drainage, salinity and sodicity.
143	Britto clay loam, ponded	40	85	100	30x40	4	6	Drainage and flooding, salinity and sodicity.
144	Capay clay loam	80	85	100	90	61	2	Drainage.
145	Capay clay	80	60	100	90	43	3	Drainage.
146	Carranza gravelly loam, 0 to 2 percent slopes	76	80	100	100	61	2	None.
147	Carranza gravelly clay loam, 2 to 8 percent slopes	76	70	93	100	49	4	None.
148	Carranza-Woo complex, 0 to 2 percent slopes	---	---	---	---	66*	2	
	Carranza part	76	70	100	100	---	---	None.
	Woo part	90	100	100	100	---	---	None.
149	Chaqua loam, 2 to 8 percent slopes	80	100	93	100	74	2	None.
150	Chateau clay, partially drained	80	60	100	80x40	15	5	Drainage, salinity and sodicity.
151	Chateau clay, ponded	80	60	100	40x40	8	6	Drainage and flooding, salinity and sodicity.
152	Checker loam	100	100	100	70x40	28	4	Drainage, salinity and sodicity.
153	Chinvar loam	90	100	100	80x80	58	3	Drainage, salinity.
154	Cole Variant clay loam, 2 to 5 percent slopes	70	85	95	90	51	3	Drainage.
155	Conosta clay loam, 2 to 8 percent slopes	56	85	93	100	44	3	None.
156	Conosta clay loam, 8 to 15 percent slopes	56	85	80	100	38	4	None.
157	Conosta clay loam, 15 to 30 percent slopes	56	85	65	100	31	4	None.
158	Conosta-Arburua complex, 15 to 30 percent slopes	---	---	---	---	33*	4	
	Conosta part	56	85	65	100	---	---	None.
	Arburua part	60	100	65	90	---	---	Erosion.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
159	Contra Costa loam, 30 to 50 percent slopes	64	100	35	100	22	4	None.
160	Contra Costa loam, 50 to 65 percent slopes	64	100	25	100	16	5	None.
161	Damluis clay loam, 0 to 2 percent slopes---	80	85	100	100	68	2	None.
162	Damluis clay loam, 2 to 8 percent slopes---	80	85	93	100	63	2	None.
163	Damluis gravelly clay loam, 0 to 2 percent slopes------------------------------------	80	65	100	100	52	3	None.
164	Damluis gravelly clay loam, 2 to 8 percent slopes------------------------------------	70	70	93	100	46	3	None.
165	Damluis gravelly clay loam, 8 to 15 percent slopes------------------------------------	70	70	80	100	39	4	None.
166	Damluis Variant clay loam------------------	30	85	100	100	25	4	None.
167	Deldota clay, partially drained------------	100	60	100	80	48	3	None.
168	Dosamigos clay loam, partially drained-----	85	80	100	80x75	41	3	Drainage, sodic subsoil.
169	Dosamigos clay, partially drained----------	85	60	100	80x80	33	4	Drainage, saline subsoil.
170	Dospalos clay loam, partially drained------	80	85	100	80	54	3	Drainage.
171	Dospalos clay, partially drained-----------	80	60	100	80	38	4	Drainage.
172	Dospalos clay, hummocky--------------------	80	60	100	70x 80x90	24	4	Drainage, salinity, microrelief.
173	Dospalos-Bolfar complex, occasionally flooded------------------------------------	---	---	---	---	32*	4	
	Dospalos part----------------------------	80	60	100	60x 80x90	---	---	Drainage and flooding, salinity, microrelief.
	Bolfar part------------------------------	95	85	100	60x90	---	---	Drainage and flooding, microrelief.
174	Dospalos-Urban land complex, partially drained------------------------------------	---	---	---	---	30*	4	
	Dospalos part----------------------------	80	85	100	80	---	---	Drainage.
	Urban land part--------------------------	---	---	---	---	---	---	
175	Edminster loam-----------------------------	70	100	100	50x 30x90	9	6	Drainage, salinity and sodicity, microrelief.
176	Edminster-Kesterson complex----------------	---	---	---	---	9*	6	
	Edminster part---------------------------	70	100	100	50x 30x90	---	---	Drainage, salinity and sodicity, microrelief.
	Kesterson part---------------------------	70	90	100	50x 30x90	---	---	Drainage, sodicity, microrelief.
177	Edminster Variant sand---------------------	90	60	100	75x90	36	4	Drainage, microrelief.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
178	Elnido sandy loam, partially drained	95	95	100	80	72	2	Drainage.
179	Elnido sandy loam, wet	95	95	100	55x90	45	3	Drainage, microrelief.
180	Elnido clay loam, partially drained	95	85	100	80	65	2	Drainage.
181	Escano clay loam, partially drained	90	85	100	80	61	2	Drainage.
182	Fifield sandy loam, 50 to 65 percent slopes	50	95	25	95	11	5	Fertility.
183	Fifield-Gonzaga complex, 30 to 50 percent slopes	---	---	---	---	15*	5	
	Fifield part	50	95	35	95	---	---	Fertility.
	Gonzaga part	40	100	35	100	---	---	None.
184	Fifield-Honker-Gonzaga complex, 50 to 65 percent slopes					10*	5	
	Fifield part	50	95	25	95	---	---	Fertility.
	Honker part	35	95	25	95	---	---	Fertility.
	Gonzaga part	40	100	25	100	---	---	None.
185	Fifield-Millsholm complex, 30 to 50 percent slopes	---	---	---	---	15*	5	
	Fifield part	50	95	35	95	---	---	Fertility.
	Millsholm part	40	100	35	95	---	---	Fertility.
186	Fluvaquents, channeled	80	65	100	30x60	9	6	Flooding, microrelief.
187	Franciscan sandy loam, 50 to 75 percent slopes	65	95	20	95	12	5	Fertility.
188	Franciscan-Quinto-Honker complex, 50 to 75 percent slopes	---	---	---	---	8*	6	
	Franciscan part	65	95	20	95	---	---	Fertility.
	Quinto part	35	70	20	95x90	---	---	Fertility, erosion.
	Honker part	35	95	20	95	---	---	Fertility.
189	Franciscan-Rock outcrop complex, 30 to 50 percent slopes	---	---	---	---	11*	5	
	Franciscan part	65	95	35	95	---	---	Fertility.
	Rock outcrop part	---	---	---	---	---	---	
190	Gonzaga-Honker complex, 30 to 50 percent slopes	---	---	---	---	13*	5	
	Gonzaga part	40	100	35	100	---	---	None.
	Honker part	35	95	35	95	---	---	Fertility.
191	Gonzaga-Honker complex, 50 to 65 percent slopes	---	---	---	---	9*	6	
	Gonzaga part	40	100	25	100	---	---	None.
	Honker part	35	95	25	95	---	---	Fertility.
192	Henmel clay loam, partially drained	80	85	100	75	51	3	Drainage.
193	Herito loam	40	100	97	100	39	4	None.
194	Honker sandy loam, 30 to 50 percent slopes	35	95	35	95	11	5	Fertility.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
195	Honker sandy loam, 50 to 65 percent slopes	35	95	25	95	8	6	Fertility.
196	Honker-Millsholm-Rock outcrop complex, 30 to 50 percent slopes	---	---	---	---	12*	5	
	Honker part	35	95	35	95	---	---	Fertility.
	Millsholm part	40	100	35	95	---	---	Fertility.
	Rock outcrop part	---	---	---	---	---	---	
197	Honker-Quinto complex, 30 to 50 percent slopes	---	---	---	---	9*	6	
	Honker part	35	95	35	95	---	---	Fertility.
	Quinto part	35	70	35	95x90	---	---	Fertility, erosion.
198	Kesterson sandy loam	70	90	100	50x 30x90	9	6	Drainage, sodicity, microrelief.
199	Kesterson sandy loam, ponded	70	95	100	40x 30x90	---	---	Drainage and flooding, sodicity, microrelief.
200	Kesterson loam, ponded	70	100	100	40x 30x90	---	---	Drainage and flooding, sodicity, microrelief.
201	Kesterson-Edminster complex	---	---	---	---	9*	6	
	Kesterson part	70	90	100	50x 30x90	---	---	Drainage, sodicity, microrelief.
	Edminster part	70	100	100	50x 30x90	---	---	Drainage, salinity and sodicity, microrelief.
202	Laveaga-Lecrag complex, 30 to 50 percent slopes	---	---	---	---	16*	5	
	Laveaga part	72	80	35	95	---	---	Fertility.
	Lecrag part	70	60	35	100	---	---	None.
203	Laveaga-Lecrag complex, 50 to 75 percent slopes	---	---	---	---	10*	5	
	Laveaga part	72	80	20	95	---	---	Fertility.
	Lecrag part	70	60	20	100	---	---	None.
204	Laveaga complex, 30 to 50 percent slopes	72	60	35	95	14	5	Fertility.
205	Laveaga-Hytop complex, 50 to 65 percent slopes	---	---	---	---	11*	5	
	Laveaga part	72	80	25	95	---	---	Fertility.
	Hytop part	25	95	25	95	---	---	Fertility.
206	Los Banos clay loam, 0 to 2 percent slopes	80	85	100	100	68	2	None.
207	Los Banos clay loam, 2 to 8 percent slopes	80	85	93	100	63	2	None.
208	Los Banos clay loam, 8 to 15 percent slopes	80	85	80	100	54	3	None.
209	Los Banos-Pleito clay loams, 2 to 8 percent slopes	---	---	---	---	68*	2	
	Los Banos part	80	85	93	100	---	---	None.
	Pleito part	95	85	93	100	---	---	None.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
210	Los Banos Variant gravelly sandy clay loam	80	70	100	100	56	3	None.
211	Marcuse silty clay------------------------	80	65	95	30x40	6	6	Drainage and flooding, salinity and sodicity.
212	Marcuse clay, leveled---------------------	80	60	100	40x40	8	6	Drainage and flooding, salinity and sodicity.
213	Millsholm loam, 8 to 15 percent slopes-----	40	100	80	100	32	4	None.
214	Millsholm loam, 30 to 50 percent slopes----	40	100	35	100	14	5	None.
215	Millsholm loam, 50 to 65 percent slopes----	40	100	25	100	10	5	None.
216	Millsholm-Fifield complex, 30 to 50 percent slopes--------------------------------	---	---	---	---	15*	5	
	Millsholm part-------------------------	40	100	35	100	---	---	None.
	Fifield part---------------------------	50	95	35	95	---	---	Fertility.
217	Millsholm-Honker-Rock outcrop complex, 30 to 50 percent slopes--------------------	---	---	---	---	10*	5	
	Millsholm part-------------------------	40	100	35	100	---	---	None.
	Honker part----------------------------	35	95	35	95	---	---	Fertility.
	Rock outcrop part----------------------	---	---	---	---	---	---	
218	Millsholm-Rock outcrop complex, 15 to 30 percent slopes---------------------------	---	---	---	---	19*	5	
	Millsholm part-------------------------	40	100	65	100	---	---	None.
	Rock outcrop part----------------------	---	---	---	---	---	---	
219	Millsholm-Rock outcrop complex, 30 to 50 percent slopes---------------------------	---	---	---	---	10*	5	
	Millsholm part-------------------------	40	100	35	100	---	---	None.
	Rock outcrop part----------------------	---	---	---	---	---	---	
220	Mollic Xerofluvents, channeled------------	80	95	100	50x 95x60	22	4	Drainage and flooding, fertility, microrelief.
221	Oneil silt loam, 8 to 15 percent slopes----	60	100	80	90	43	3	Erosion.
222	Oneil silt loam, 15 to 30 percent slopes---	60	100	65	90	35	4	Erosion.
223	Oneil silt loam, 30 to 50 percent slopes---	60	100	35	90	19	5	Erosion.
224	Oquin fine sandy loam, 2 to 8 percent slopes----------------------------------	75	100	93	100	70	2	None.
225	Oquin fine sandy loam, 15 to 30 percent slopes----------------------------------	75	100	65	90	44	3	Erosion.
226	Orognen sandy loam, 2 to 5 percent slopes--	55	95	95	95	47	3	Fertility.
227	Orognen-Quiensabe complex, 30 to 50 percent slopes--------------------------------	---	---	---	---	15*	5	
	Orognen part---------------------------	40	95	35	95	---	---	Fertility.
	Quiensabe part-------------------------	65	80	35	95	---	---	Fertility.
228	Palazzo sandy loam, partially drained------	95	95	100	80	72	2	Drainage.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
229	Paver clay loam, 0 to 2 percent slopes	100	85	100	100	85	1	None.
230	Paver clay loam, 2 to 5 percent slopes	100	85	95	100	81	1	None.
231	Peckham cobbly loam, 2 to 5 percent slopes	40	70	95	100	27	4	None.
232	Peckham cobbly loam, 5 to 15 percent slopes	40	70	85	100	24	4	None.
233	Peckham-Cole Variant association, 2 to 30 percent slopes	---	---	---	---	32*	4	
	Peckham part	40	70	65	100	---	---	None.
	Cole part	70	85	90	90	---	---	Drainage.
234	Pedcat loam, 0 to 2 percent slopes	40	85	100	60x 50x90	9	6	Drainage, salinity and sodicity, microrelief.
235	Pedcat loam, 0 to 2 percent slopes, eroded	40	80	100	60x50 x90x 90	8	6	Drainage, salinity and sodicity, erosion, microrelief.
236	Pedcat clay loam, leveled, 0 to 2 percent slopes	40	85	100	60x50	10	5	Drainage, salinity and sodicity.
237	Pedcat clay, 0 to 2 percent slopes, severely eroded	40	50	100	60x 50x50	3	6	Drainage, salinity and sodicity, erosion.
238	Pits	---	---	---	---	<10	6	
239	Pleito gravelly clay loam, 8 to 15 percent slopes	95	70	80	100	53	3	None.
240	Pleito gravelly clay loam, 15 to 30 percent slopes	95	70	65	100	43	3	None.
241	Quinto-Illito-Rock outcrop complex, 30 to 50 percent slopes	---	---	---	---	3*	6	
	Quinto part	35	70	35	95x90	---	---	Fertility, erosion.
	Illito part	10	50	35	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	
242	Quinto-Millsholm-Rock outcrop complex, 40 to 75 percent slopes	---	---	---	---	4*	6	
	Quinto part	35	70	20	95x90	---	---	Fertility, erosion.
	Millsholm part	40	100	20	100	---	---	None.
	Rock outcrop part	---	---	---	---	---	---	
243	Quinto-Rock outcrop complex, 50 to 75 percent slopes	---	---	---	---	3*	6	
	Quinto part	35	70	20	95x90	---	---	Fertility, erosion.
	Rock outcrop part	---	---	---	---	---	---	
244	Rock outcrop-Ararat-Illito complex, 30 to 75 percent slopes	---	---	---	---	1*	6	
	Rock outcrop part	---	---	---	---	---	---	
	Ararat part	60	40	25	100	---	---	None.
	Illito part	10	50	25	100	---	---	None.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
245	Rock outcrop-Wisflat complex, 30 to 75 percent slopes	---	---	---	---	3*	6	
	Rock outcrop part	---	---	---	---	---	---	
	Wisflat part	40	95	25	95x85	---	---	Fertility, erosion.
246	San Emigdio fine sandy loam	100	100	100	100	100	1	None.
247	San Emigdio loam	100	100	100	100	100	1	None.
248	Santanela loam	40	100	100	50x40	8	6	Drainage, salinity and sodicity.
249	San Timoteo sandy loam, 2 to 8 percent slopes	70	95	93	95	59	3	Fertility.
250	San Timoteo-Wisflat sandy loams complex, 8 to 15 percent slopes	---	---	---	---	39*	4	
	San Timoteo part	70	95	80	95	---	---	Fertility.
	Wisflat part	40	95	80	95x90	---	---	Fertility, erosion.
251	San Timoteo-Wisflat sandy loams complex, 15 to 30 percent slopes	---	---	---	---	32*	4	
	San Timoteo part	70	95	65	95	---	---	Fertility.
	Wisflat part	40	95	65	95x90	---	---	Fertility, erosion.
252	Sehorn-Contra Costa complex, 30 to 50 percent slopes	---	---	---	---	14*	5	
	Sehorn part	45	60	35	100	---	---	None.
	Contra Costa part	64	100	35	100	---	---	None.
253	Stanislaus clay loam	90	85	100	100	76	2	None.
254	Stanislaus clay loam, wet	90	85	100	80	61	2	Drainage.
255	Stanislaus-Dosamigos-Urban land complex	---	---	---	---	32*	4	
	Stanislaus part	90	85	100	100	---	---	None.
	Dosamigos part	85	60	100	80x80	---	---	Drainage, saline subsoil.
	Urban land part	---	---	---	---	---	---	
256	Triangle clay	85	55	100	40x60	11	5	Drainage, sodicity.
257	Triangle clay, sodic	80	50	100	40x40	6	6	Drainage, salinity and sodicity.
258	Trulae silty clay, partially drained	75	60	100	80x60	22	4	Drainage, salinity and sodicity.
259	Tunehill-Quiensabe complex, 30 to 50 percent slopes	---	---	---	---	16*	5	
	Tunehill part	40	100	35	90	---	---	Erosion.
	Quiensabe part	65	85	35	100	---	---	None.
260	Turlock sandy loam	75	95	100	40x 60x90	15	5	Drainage and flooding, salinity and sodicity, microrelief.
261	Turlock loam, leveled	75	100	100	50x60	22	4	Drainage and flooding, salinity and sodicity.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
262	Turmound sandy loam	80	95	100	60x 40x90	16	5	Drainage, salinity and sodicity, microrelief.
263	Vernalis loam, 2 to 5 percent slopes	95	100	95	100	90	1	None.
264	Vernalis-Pedcat, eroded complex, 2 to 5 percent slopes	---	---	---	---	57*	3	
	Vernalis part	95	100	95	100	---	---	None.
	Pedcat part	40	85	95	60x 50x90	---	---	Drainage, salinity and sodicity, erosion.
265	Volta clay loam	60	85	100	50x50	13	5	Drainage and flooding, salinity and sodicity.
266	Volta clay loam, partially drained	60	85	100	80x70	28	4	Drainage, salinity and sodicity.
267	Wekoda clay, partially drained	80	60	100	80x80	31	4	Drainage, salinity.
268	Wisflat-Arburua complex, 15 to 30 percent slopes	---	---	---	---	24*	4	
	Wisflat part	40	95	65	95x85	---	---	Fertility, erosion.
	Arburua part	60	100	65	95x90	---	---	Fertility, erosion.
269	Wisflat-Arburua complex, 30 to 50 percent slopes	---	---	---	---	13*	5	
	Wisflat part	40	95	35	95x85	---	---	Fertility, erosion.
	Arburua part	60	100	35	95x90	---	---	Fertility, erosion.
270	Wisflat-Rock outcrop-Arburua complex, 15 to 30 percent slopes	---	---	---	---	16*	5	
	Wisflat part	40	95	65	95x90	---	---	Fertility, erosion.
	Rock outcrop part	---	---	---	---	---	---	
	Arburua part	60	100	65	95x90	---	---	Fertility, erosion.
271	Wisflat-Rock outcrop-Arburua complex, 30 to 50 percent slopes	---	---	---	---	9*	6	
	Wisflat part	40	95	35	95x90	---	---	Fertility, erosion.
	Rock outcrop part	---	---	---	---	---	---	
	Arburua part	60	100	35	95x90	---	---	Fertility, erosion.
272	Wisflat-Rock outcrop-Arburua complex, 50 to 75 percent slopes	---	---	---	---	5*	6	
	Wisflat part	40	95	20	95x90	---	---	Fertility, erosion.
	Rock outcrop part	---	---	---	---	---	---	
	Arburua part	60	100	20	95x90	---	---	Fertility, erosion.
273	Wisflat-Rock outcrop-Oneil complex, 30 to 50 percent slopes	---	---	---	---	9*	6	
	Wisflat part	40	95	35	95x90	---	---	Fertility, erosion.
	Rock outcrop part	---	---	---	---	---	---	
	Oneil part	60	100	35	90	---	---	Erosion.
274	Woo loam, 0 to 2 percent slopes	100	100	100	100	100	1	None.
275	Woo loam, gravelly substratum, 0 to 2 percent slopes	90	100	100	100	90	1	None.
276	Woo sandy clay loam, 0 to 2 percent slopes	100	80	100	100	80	1	None.

See footnote at end of table.

TABLE 4.--STORIE INDEX RATING--Continued

Map symbol	Soil name	Rating factors A	B	C	X	Index	Grade	Limitation in X factor
277	Woo clay loam, 0 to 2 percent slopes	100	85	100	100	85	1	None.
278	Woo clay loam, 2 to 5 percent slopes	100	85	95	100	81	1	None.
279	Woo clay loam, wet, 0 to 2 percent slopes	95	85	100	80	65	2	Drainage.
280	Woo clay, 0 to 2 percent slopes	100	60	100	100	60	2	None.
281	Woo-Anela-Urban land complex, 0 to 2 percent slopes	---	---	---	---	41*	3	
	Woo part	100	80	100	100	---	---	None.
	Anela part	80	70	100	100	---	---	None.
	Urban land part	---	---	---	---	---	---	
282	Woo-Urban land complex, 0 to 2 percent slopes	---	---	---	---	44*	3	
	Woo part	98	93	100	91	---	---	Drainage.
	Urban land part	---	---	---	---	---	---	
283	Xerofluvents, channeled	100	100	100	60x60	36	4	Drainage and flooding, microrelief.
284	Xerofluvents, extremely gravelly	80	40	100	60x60	11	5	Drainage and flooding, microrelief.
285	Yokut sandy loam	55	95	100	95	50	3	Fertility.
286	Yokut loam	55	100	100	100	55	3	None.

* Weighted average.

TABLE 5.--LAND CAPABILITY CLASSIFICATION

(Classification in the N columnm is for nonirrigated soils; that in the I column is for irrigated soils. Absence of an entry indicates no classification has been assigned)

Soil name and map symbol	Classification N	Classification I
101 Agnal	VIIw	---
102*:		
Akad	VIIe	---
Conosta	VIe	---
103, 104 Alros	VIIw	IVw
105* Altamont Variant-Hytop	VIe	---
106 Anela	IVs	IIIs
107 Anela	IVe	IVe
108 Anela	IVe	---
109 Apollo	IVe	IIIe
110 Apollo	IVe	IVe
111 Apollo	VIe	---
112 Ararat	VIIs	---
113* Ararat-Gonzaga	VIIe	---
114* Ararat-Peckham	VIIs	---
115* Ararat-Peckham	VIIe	---
116 Arbuckle Variant	IVs	IIs
117, 118 Arburua	IVe	---
119 Arburua	VIe	---
120 Arburua	VIIe	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
121, 122----------------- Asolt	VIs	---
123, 124, 125------------ Ayar	IVe	---
126---------------------- Ayar	VIe	---
127*, 128*--------------- Ayar-Arburua	IVe	---
129*--------------------- Ayar-Arburua	VIe	---
130*--------------------- Ayar-Oneil	VIe	---
131---------------------- Ballvar	IVe	---
132*:		
Ballvar------------------	IVe	---
Pedcat-------------------	VIIw	---
133---------------------- Bapos	IVs	IIIs
134---------------------- Bapos	IVe	---
135---------------------- Bapos	IVe	---
136*--------------------- Bapos-Arburua	IVe	---
137, 138----------------- Bisgani	IVw	IIIw
139, 140----------------- Bolfar	IVw	IIw
141---------------------- Britto	VIIw	---
142---------------------- Britto	VIIw	IVw
143---------------------- Britto	VIIw	---
144, 145----------------- Capay	IVs	IIs
146---------------------- Carranza	IVs	---
147---------------------- Carranza	IVe	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
148*---------------------- Carranza-Woo	IVs	IIs
149---------------------- Chaqua	IVe	IIIe
150---------------------- Chateau	VIw	IIIw
151---------------------- Chateau	VIIw	---
152---------------------- Checker	VIIs	---
153---------------------- Chinvar	IVs	IIIs
154---------------------- Cole Variant	IIIe	IIe
155, 156----------------- Conosta	IVe	---
157---------------------- Conosta	VIe	---
158*--------------------- Conosta-Arburua	VIe	---
159---------------------- Contra Costa	VIe	---
160---------------------- Contra Costa	VIIe	---
161---------------------- Damluis	IVs	IIs
162---------------------- Damluis	IVe	IIe
163---------------------- Damluis	IVs	IIs
164---------------------- Damluis	IVe	IIe
165---------------------- Damluis	IVe	---
166---------------------- Damluis Variant	IVs	IIIs
167---------------------- Deldota	IVw	IIw
168, 169----------------- Dosamigos	VIw	IIIw
170, 171----------------- Dospalos	IVw	IIw

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
172------ Dospalos	VIw	IIIw
173*------ Dospalos-Bolfar	VIw	IIIw
174*------ Dospalos-Urban land	IVw	IIw
175------ Edminster	VIIw	IVw
176*------ Edminster-Kesterson	VIIw	IVw
177------ Edminster Variant	VIw	IIIw
178------ Elnido	IVw	IIw
179------ Elnido	IVw	IIIw
180------ Elnido	IVw	IIw
181------ Escano	IVw	IIw
182------ Fifield	VIIe	---
183*------ Fifield-Gonzaga	VIIe	---
184*------ Fifield-Honker-Gonzaga	VIIe	---
185*------ Fifield-Millsholm	VIIe	---
186------ Fluvaquents	VIIIw	---
187------ Franciscan	VIIe	---
188*------ Franciscan-Quinto-Honker	VIIe	---
189*------ Franciscan-Rock outcrop	VIIe	---
190*------ Gonzaga-Honker	VIe	---
191*------ Gonzaga-Honker	VIIe	---
192------ Henmel	IVw	IIw

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
193----------------------- Herito	IVs	---
194----------------------- Honker	VIe	---
195----------------------- Honker	VIIe	---
196*---------------------- Honker-Millsholm-Rock outcrop	VIe	---
197*---------------------- Honker-Quinto	VIIe	---
198----------------------- Kesterson	VIIw	IVw
199, 200------------------ Kesterson	VIIw	---
201*---------------------- Kesterson-Edminster	VIIw	IVw
202*---------------------- Laveaga-Lecrag	VIe	---
203*---------------------- Laveaga-Lecrag	VIIe	---
204*---------------------- Laveaga complex	VIe	---
205*---------------------- Laveaga-Hytop	VIIe	---
206----------------------- Los Banos	IVs	IIs
207----------------------- Los Banos	IVe	IIe
208----------------------- Los Banos	IVe	IIIe
209*---------------------- Los Banos-Pleito	IVe	IIe
210----------------------- Los Banos Variant	IVs	IIs
211----------------------- Marcuse	VIIw	---
212----------------------- Marcuse	VIIw	IVw
213----------------------- Millsholm	VIe	---
214, 215------------------ Millsholm	VIIe	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
216*----------------------- Millsholm-Fifield	VIIe	---
217*----------------------- Millsholm-Honker-Rock outcrop	VIIe	---
218*, 219*--------------- Millsholm-Rock outcrop	VIIe	---
220----------------------- Mollic Xerofluvents	VIe	---
221----------------------- Oneil	IVe	---
222----------------------- Oneil	VIe	---
223----------------------- Oneil	VIIe	---
224, 225----------------- Oquin	IVe	---
226----------------------- Orognen	IIIe	---
227*----------------------- Orognen-Quiensabe	VIIe	---
228----------------------- Palazzo	IVw	IIw
229----------------------- Paver	IVc	I
230----------------------- Paver	IVe	IIe
231, 232----------------- Peckham	VIe	---
233*:		
Peckham------------------	VIe	---
Cole Variant-------------	IIIe	---
234, 235----------------- Pedcat	VIIw	---
236----------------------- Pedcat	VIIw	IVw
237----------------------- Pedcat	VIIw	---
238*. Pits		

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
239-----Pleito	IVe	IIIe
240-----Pleito	VIe	---
241*-----Quinto-Illito-Rock outcrop	VIIe	---
242*-----Quinto-Millsholm-Rock outcrop	VIIe	---
243*-----Quinto-Rock outcrop	VIIe	---
244*-----Rock outcrop-Ararat-Illito	VIIe	---
245*-----Rock outcrop-Wisflat	VIIe	---
246, 247-----San Emigdio	IVc	I
248-----Santanela	VIIw	---
249-----San Timoteo	IVe	---
250*, 251*-----San Timoteo-Wisflat	VIe	---
252*-----Sehorn-Contra Costa	VIe	---
253-----Stanislaus	IVs	IIs
254-----Stanislaus	IVw	IIw
255*-----Stanislaus-Dosamigos-Urban land	IVs	IIs
256, 257-----Triangle	VIIw	---
258-----Trulae	VIw	IIIw
259*-----Tunehill-Quiensabe	VIIe	---
260-----Turlock	VIIw	---
261-----Turlock	VIIw	VIw

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
262----------------------- Turmound	VIIw	---
263----------------------- Vernalis	IVe	---
264*---------------------- Vernalis-Pedcat	IVe	---
265----------------------- Volta	VIIw	---
266----------------------- Volta	VIIw	IVw
267----------------------- Wekoda	IVw	IIIw
268, 269*----------------- Wisflat-Arburua	VIIe	---
270*---------------------- Wisflat-Rock outcrop-Arburua	VIe	---
271*, 272*---------------- Wisflat-Rock outcrop-Arburua	VIIe	---
273*---------------------- Wisflat-Rock outcrop-Oneil	VIIe	---
274----------------------- Woo	IVc	I
275, 276------------------ Woo	VIs	IIs
277----------------------- Woo	IVc	I
278----------------------- Woo	IVe	IIe
279----------------------- Woo	IVw	IIw
280----------------------- Woo	IVs	IIs
281*---------------------- Woo-Anela-Urban land	IVs	IIs
282*---------------------- Woo-Urban land	IVw	IIw
283----------------------- Xerofluvents	IVw	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSIFICATION--Continued

Soil name and map symbol	Classification	
	N	I
284 Xerofluvents	VIs	---
285 Yokut	IVs	IIIs
286 Yokut	IVs	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
101: Agnal	Loamy Saline-Alkali Wetland (17f).	Favorable	2,000	Iodinebush	25
		Normal	1,500	Saltgrass	25
		Unfavorable	800	Alkali heath	10
				Baltic rush	5
				Goldfields	5
				Rabbitfootgrass	5
102*:					
Akad	Shallow Coarse Loamy (15e)	Favorable	1,500	Soft chess	30
		Normal	1,000	Wild oat	20
		Unfavorable	800	Red brome	10
				Filaree	10
				Foxtail fescue	5
				Burclover	5
Conosta	Loamy (15e)	Favorable	2,800	Soft chess	35
		Normal	2,000	Wild oat	15
		Unfavorable	1,200	Filaree	15
				Red brome	5
				Foxtail fescue	5
				Ripgut brome	5
105*:					
Altamont Variant	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Burclover	15
		Unfavorable	1,800	Soft chess	15
				Filaree	10
				Ripgut brome	5
				Foxtail fescue	5
Hytop	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	30
		Unfavorable	1,500	Foxtail fescue	5
				Clover	5
				Purple needlegrass	5
				Filaree	5
107, 108: Anela	Very Gravelly Loamy (17e)	Favorable	1,200	Soft chess	40
		Normal	800	Foxtail fescue	15
		Unfavorable	500	Filaree	10
				Red brome	5
				Wild oat	5
110, 111: Apollo	Fine Loamy (15e)	Favorable	3,500	Soft chess	40
		Normal	2,800	Wild oat	15
		Unfavorable	1,000	Filaree	15
				Red brome	5
				Foxtail fescue	5
				Burclover	5
				Ripgut brome	5
				Mouse barley	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
112: Ararat	Blue Oak-Annual Grass-Stony Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	10
				Blue oak	10
				Foxtail fescue	5
				Filaree	5
				California buckeye	5
113*:					
Ararat	Blue Oak-Annual Grass-Stony Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	10
				Blue oak	10
				Foxtail fescue	5
				Filaree	5
				California buckeye	5
Gonzaga	Blue Oak-Annual Grass-Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	10
				Blue oak	5
				California buckeye	5
				Filaree	5
114*, 115*:					
Ararat	Blue Oak-Annual Grass-Stony Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	10
				Blue oak	10
				Foxtail fescue	5
				Filaree	5
				California buckeye	5
Peckham	Loamy (15e)	Favorable	2,800	Soft chess	35
		Normal	2,400	Filaree	15
		Unfavorable	1,500	Foxtail fescue	15
				Wild oat	10
				Burclover	5
				Lupine	5
117, 118, 119, 120: Arburua	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Foxtail fescue	20
		Unfavorable	1,500	Wild oat	10
				Red brome	10
				Filaree	5
				Mouse barley	5
				Ripgut brome	5
121, 122: Asolt	Clayey (15e)	Favorable	3,800	Wild oat	50
		Normal	3,000	Soft chess	15
		Unfavorable	1,500	Filaree	10
				Red brome	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Compo-sition
		Kind of year	Dry weight		
			Lb/acre		Pct
123, 124, 125, 126-- Ayar	Clayey Low Elevation (15e)	Favorable	3,200	Soft chess	25
		Normal	2,800	Red brome	20
		Unfavorable	1,500	Filaree	10
				Ripgut brome	10
				Clover	10
				Wild oat	5
				Lupine	5
				Foxtail fescue	5
127*, 128*, 129*:					
Ayar	Clayey Low Elevation (15e)	Favorable	3,200	Soft chess	25
		Normal	2,800	Red brome	20
		Unfavorable	1,500	Filaree	10
				Ripgut brome	10
				Clover	10
				Wild oat	5
				Lupine	5
				Foxtail fescue	5
Arburua	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Foxtail fescue	20
		Unfavorable	1,500	Wild oat	10
				Red brome	10
				Filaree	5
				Mouse barley	5
				Ripgut brome	5
130*:					
Ayar	Clayey Low Elevation (15e)	Favorable	3,200	Soft chess	25
		Normal	2,800	Red brome	20
		Unfavorable	1,500	Filaree	10
				Ripgut brome	10
				Clover	10
				Wild oat	5
				Lupine	5
				Foxtail fescue	5
Oneil	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Wild oat	15
		Unfavorable	1,500	Ripgut brome	10
				Filaree	10
				Burclover	5
				Red brome	5
131-- Ballvar	Fine Loamy (17e)	Favorable	3,500	Soft chess	30
		Normal	2,800	Wild oat	25
		Unfavorable	1,000	Red brome	10
				Filaree	10
				Foxtail fescue	5
				Ripgut brome	5
132*:					
Ballvar	Fine Loamy (17e)	Favorable	3,500	Soft chess	30
		Normal	2,800	Wild oat	25
		Unfavorable	1,000	Red brome	10
				Filaree	10
				Foxtail fescue	5
				Ripgut brome	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
132*:					
Pedcat	Loamy Saline-Alkali (17g)	Favorable	1,000	Spinescale saltbush	25
		Normal	800	Red brome	20
		Unfavorable	500	Alkali heath	15
				Barley	10
				Iodinebush	5
134, 135 Bapos	Fine Loamy (17e)	Favorable	3,200	Soft chess	30
		Normal	3,000	Red brome	15
		Unfavorable	1,500	Filaree	15
				Wild oat	10
				Fescue	5
				Ripgut brome	5
136*:					
Bapos	Fine Loamy (17e)	Favorable	3,200	Soft chess	30
		Normal	3,000	Red brome	15
		Unfavorable	1,500	Filaree	15
				Wild oat	10
				Fescue	5
				Ripgut brome	5
Arburua	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Foxtail fescue	20
		Unfavorable	1,500	Wild oat	10
				Red brome	10
				Filaree	5
				Mouse barley	5
				Ripgut brome	5
138 Bisgani	Fine Loamy Saline (17f)	Favorable	3,500	Beardless wildrye	25
		Normal	2,800	Saltgrass	15
		Unfavorable	1,500	Soft chess	10
				Saltbush	10
				Baltic rush	5
				Lippia	5
140 Bolfar	Fine Loamy Saline (17f)	Favorable	3,500	Beardless wildrye	20
		Normal	2,500	Saltgrass	15
		Unfavorable	1,200	Soft chess	15
				Ripgut brome	5
				Saltbush	5
141 Britto	Loamy Saline-Alkali Wetland (17f).	Favorable	2,000	Saltgrass	25
		Normal	1,500	Iodinebush	25
		Unfavorable	800	Alkali heath	10
				Mouse barley	10
				Foxtail fescue	10
				Goldfields	5
143 Britto	Clayey Saline-Alkali Wetland (17f).	Favorable	1,200	Tule bulrush	15
		Normal	800	Alkali heath	10
		Unfavorable	600	Baltic rush	10
				Barley	5
				Saltgrass	5
				Iodinebush	5
				Swamp timothy	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
146, 147: Carranza	Loamy (17e)	Favorable	3,000	Soft chess	35
		Normal	2,500	Foxtail fescue	10
		Unfavorable	1,000	Filaree	10
				Wild oat	10
				Foxtail barley	5
				Red brome	5
				Ripgut brome	5
149: Chaqua	Loamy (17e)	Favorable	3,000	Soft chess	30
		Normal	2,500	Filaree	15
		Unfavorable	1,200	Purple needlegrass	5
				Foxtail fescue	5
				Wild oat	5
				Red brome	5
151: Chateau	Loamy Saline-Alkali Wetland (17f).	Favorable	1,000	Spinescale saltbush	50
		Normal	800	Spanish brome	25
		Unfavorable	500	Mouse barley	5
				Alkali heath	5
				Iodinebush	5
152: Checker	Loamy Saline-Alkali Subirrigated (17f).	Favorable	3,200	Saltgrass	40
		Normal	2,400	Spanish brome	10
		Unfavorable	1,600	Mediterranean barley	10
				Alkali heath	5
				Saltbush	5
				Iodinebush	5
154: Cole Variant	Fine Loamy Subirrigated (15e)	Favorable	4,000	Soft chess	20
		Normal	3,500	Pine bluegrass	20
		Unfavorable	2,500	Filaree	15
				Wild oat	10
				California melicgrass	10
				Foxtail fescue	5
155, 156, 157: Conosta	Loamy (15e)	Favorable	2,800	Soft chess	35
		Normal	2,000	Wild oat	15
		Unfavorable	1,200	Filaree	15
				Red brome	5
				Foxtail fescue	5
				Ripgut brome	5
158*:					
Conosta	Loamy (15e)	Favorable	2,800	Soft chess	35
		Normal	2,000	Wild oat	15
		Unfavorable	1,200	Filaree	15
				Red brome	5
				Foxtail fescue	5
				Ripgut brome	5
Arburua	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Foxtail fescue	20
		Unfavorable	1,500	Wild oat	10
				Red brome	10
				Filaree	5
				Mouse barley	5
				Ripgut brome	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
159, 160 Contra Costa	Loamy (15e)	Favorable	3,000	Soft chess	30
		Normal	2,800	Wild oat	20
		Unfavorable	1,500	Burclover	10
				Filaree	10
				California brome	5
				Ripgut brome	5
				Red brome	5
				Clover	5
161, 162 Damluis	Fine Loamy (17e)	Favorable	3,500	Soft chess	30
		Normal	3,200	Filaree	15
		Unfavorable	1,000	Wild oat	10
				Ripgut brome	5
				Foxtail fescue	5
				Burclover	5
				Red brome	5
164, 165 Damluis	Fine Loamy (17e)	Favorable	3,500	Soft chess	25
		Normal	3,200	Filaree	15
		Unfavorable	1,000	Red brome	10
				Wild oat	10
				Foxtail fescue	10
				Burclover	5
				Ripgut brome	5
172 Dospalos	Fine Loamy Saline (17f)	Favorable	3,500	Beardless wildrye	40
		Normal	2,500	Saltgrass	10
		Unfavorable	1,200	Soft chess	10
				Barley	5
				Saltbush	5
173*:					
Dospalos	Fine Loamy Saline (17f)	Favorable	3,000	Saltgrass	25
		Normal	2,400	Beardless wildrye	15
		Unfavorable	1,000	Soft chess	15
				Baltic rush	10
				Barley	5
				Saltbush	5
Bolfar	Fine Loamy Saline (17f)	Favorable	3,500	Beardless wildrye	20
		Normal	2,600	Soft chess	15
		Unfavorable	1,200	Saltgrass	10
				Barley	5
				Ripgut brome	5
				Saltbush	5
175 Edminster	Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	15
		Normal	1,800	Filaree	15
		Unfavorable	1,000	Soft chess	10
				Alkali heath	10
				Mouse barley	10
				Alkali sacaton	5
				Lippia	5
				Burclover	5
				Saltbush	5
				Red brome	5
				Foxtail fescue	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
176*:					
Edminster	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	15
		Normal	1,800	Filaree	15
		Unfavorable	1,000	Soft chess	10
				Alkali heath	10
				Mouse barley	10
				Alkali sacaton	5
				Lippia	5
				Burclover	5
				Saltbush	5
				Red brome	5
				Foxtail fescue	5
Kesterson	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	15
		Normal	1,800	Soft chess	15
		Unfavorable	1,000	Filaree	15
				Mouse barley	15
				Alkali heath	10
				Alkali sacaton	5
				Lippia	5
				Saltbush	5
177 Edminster Variant	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,000	Saltgrass	40
		Normal	1,500	Iodinebush	10
		Unfavorable	800	Alkali heath	10
				Soft chess	10
				Baltic rush	5
				Alkaliweed	5
				Barley	5
179 Elnido	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,000	Saltgrass	40
		Normal	1,500	Barley	10
		Unfavorable	900	Alkali sacaton	10
				Ripgut brome	5
				Alkali blite	5
				Soft chess	5
182 Fifield	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	5
				Blue oak	5
				Interior live oak	5
				California buckeye	5
183*:					
Fifield	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	5
				Blue oak	5
				Interior live oak	5
				California buckeye	5
Gonzaga	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	10
				Blue oak	5
				California buckeye	5
				Filaree	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Compo- sition
			Lb/acre		Pct
184*:					
Fifield	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	5
				Blue oak	5
				Interior live oak	5
				California buckeye	5
Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5
Gonzaga	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	10
				Blue oak	5
				California buckeye	5
				Filaree	5
185*:					
Fifield	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	5
				Blue oak	5
				Interior live oak	5
				California buckeye	5
Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5
187 Franciscan	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,000	Ripgut brome	15
		Unfavorable	1,000	Minerslettuce	10
				Sanicle	5
				Blue oak	5
				Digger pine	5
				California buckeye	5
				Wild oat	5
				Filaree	5
				Foxtail fescue	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
188*:					
Franciscan	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,000	Ripgut brome	15
		Unfavorable	1,000	Minerslettuce	10
				Sanicle	5
				Blue oak	5
				Digger pine	5
				California buckeye	5
				Wild oat	5
				Filaree	5
				Foxtail fescue	5
Quinto	Shallow Coarse Loamy (15e)	Favorable	1,500	Soft chess	30
		Normal	1,000	California buckwheat	15
		Unfavorable	800	Red brome	10
				Wild oat	5
				Foxtail fescue	5
				Filaree	5
				California sagebrush	5
Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5
189*:					
Franciscan	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,000	Ripgut brome	15
		Unfavorable	1,000	Minerslettuce	10
				Sanicle	5
				Blue oak	5
				Digger pine	5
				California buckeye	5
				Wild oat	5
				Filaree	5
				Foxtail fescue	5
Rock outcrop.					
190*:					
Gonzaga	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	10
				Blue oak	5
				California buckeye	5
				Filaree	5
Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
191*:					
Gonzaga	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	10
				Blue oak	5
				California buckeye	5
				Filaree	5
Honker	Clayey (15)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5
193 Herito	Fine Loamy (17e)	Favorable	3,200	Soft chess	35
		Normal	3,000	Filaree	10
		Unfavorable	1,500	Clover	10
				Red brome	5
				Barley	5
				Fescue	5
				Wild oat	5
194, 195 Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5
196*:					
Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5
Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5
Rock outcrop.					
197*:					
Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
197*:					
Quinto	Shallow Coarse Loamy (15e)	Favorable	1,500	Soft chess	30
		Normal	1,000	California buckwheat	15
		Unfavorable	800	Red brome	10
				Wild oat	5
				Foxtail fescue	5
				Filaree	5
				California sagebrush	5
198 Kesterson	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	15
		Normal	1,800	Soft chess	15
		Unfavorable	1,000	Filaree	15
				Mouse barley	15
				Alkali heath	10
				Alkali sacaton	5
				Lippia	5
				Saltbush	5
199 Kesterson	Loamy Saline-Alkali Wetland (17f).	Favorable	2,000	Saltgrass	20
		Normal	1,500	Barley	15
		Unfavorable	800	Alkali sacaton	15
				Filaree	15
				Ripgut brome	5
200 Kesterson	Loamy Saline-Alkali Wetland (17f).	Favorable	2,000	Saltgrass	20
		Normal	1,500	Barley	15
		Unfavorable	800	Alkali sacaton	15
				Filaree	15
				Ripgut brome	5
201*:					
Kesterson	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	15
		Normal	1,800	Soft chess	15
		Unfavorable	1,000	Filaree	15
				Mouse barley	15
				Alkali heath	10
				Alkali sacaton	5
				Lippia	5
				Saltbush	5
Edminster	Coarse Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	15
		Normal	1,800	Filaree	15
		Unfavorable	1,000	Soft chess	10
				Alkali heath	10
				Mouse barley	10
				Alkali sacaton	5
				Lippia	5
				Burclover	5
				Saltbush	5
				Red brome	5
				Foxtail fescue	5
202*, 203*:					
Laveaga	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,500	Wild oat	20
		Unfavorable	1,500	Clover	20
				Ripgut brome	15
				Blue oak	10
				Pine bluegrass	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
202*, 203*:					
Lecrag	Blue Oak-Annual Grass Clayey (15e).	Favorable	3,500	Soft chess	30
		Normal	3,000	Wild oat	20
		Unfavorable	1,800	Ripgut brome	10
				Pine bluegrass	5
				Filaree	5
				California buckeye	5
				Blue oak	5
204*:					
Laveaga, very stony	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,500	Wild oat	20
		Unfavorable	1,500	Clover	20
				Ripgut brome	15
				Blue oak	10
				Pine bluegrass	5
Laveaga	Blue Grass-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,500	Wild oat	20
		Unfavorable	1,500	Clover	20
				Ripgut brome	15
				Blue oak	10
				Pine bluegrass	5
205*:					
Laveaga	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	30
		Normal	2,500	Wild oat	20
		Unfavorable	1,500	Clover	20
				Ripgut brome	15
				Blue oak	10
				Pine bluegrass	5
Hytop	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	30
		Unfavorable	1,500	Foxtail fescue	5
				Clover	5
				Purple needlegrass	5
				Filaree	5
207, 208 Los Banos	Fine Loamy (17e)	Favorable	3,400	Soft chess	35
		Normal	3,000	Red brome	10
		Unfavorable	1,200	Wild oat	10
				Filaree	10
				Foxtail fescue	5
				Ripgut brome	5
				Burclover	5
				Barley	5
211 Marcuse	Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	40
		Normal	1,800	Alkali heath	15
		Unfavorable	1,000	Saltbush	5
				Iodinebush	5
213, 214, 215 Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
216*:					
Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5
Fifield	Blue Oak-Annual Grass Loamy (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Ripgut brome	15
				Foxtail fescue	5
				Blue oak	5
				Interior live oak	5
				California buckeye	5
217*:					
Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5
Honker	Clayey (15e)	Favorable	4,000	Wild oat	40
		Normal	3,200	Soft chess	20
		Unfavorable	1,500	Filaree	10
				Red brome	5
				Foxtail fescue	5
				Burclover	5
Rock outcrop.					
218*, 219*:					
Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5
Rock outcrop.					
221, 222, 223 Oneil	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Wild oat	15
		Unfavorable	1,500	Ripgut brome	10
				Filaree	10
				Burclover	5
				Red brome	5
224, 225 Oquin	Coarse Loamy (15e)	Favorable	2,000	Soft chess	30
		Normal	1,600	Foxtail fescue	15
		Unfavorable	800	Wild oat	10
				Red brome	10
				Filaree	10
				Burclover	5
				Ripgut brome	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
226: Orognen	Fine Loamy (15e)	Favorable	3,500	Soft chess	30
		Normal	3,000	Wild oat	20
		Unfavorable	1,500	Filaree	10
				Mediterranean barley	10
				Foxtail fescue	10
				Red brome	5
227*:					
Orognen	Shallow Loamy (15e)	Favorable	2,000	Filaree	30
		Normal	1,400	Soft chess	20
		Unfavorable	600	Foxtail fescue	10
				Mediterranean barley	5
				Lupine	5
				Red brome	5
				Wild oat	5
Quiensabe	Blue Oak-Annual Grass Loamy (15e).	Favorable	2,500	Soft chess	40
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Foxtail fescue	10
				Filaree	10
				Ripgut brome	5
				Blue oak	5
231, 232: Peckham	Loamy (15e)	Favorable	2,800	Soft chess	35
		Normal	2,400	Filaree	15
		Unfavorable	1,500	Foxtail fescue	15
				Wild oat	10
				Burclover	5
				Lupine	5
233*:					
Peckham	Loamy (15e)	Favorable	2,800	Soft chess	35
		Normal	2,400	Filaree	15
		Unfavorable	1,500	Foxtail fescue	15
				Wild oat	10
				Burclover	5
				Lupine	5
Cole Variant	Loamy Subirrigated (15e)	Favorable	4,000	Soft chess	20
		Normal	3,500	Pine bluegrass	20
		Unfavorable	2,500	Filaree	15
				Wild oat	10
				California melicgrass	10
				Foxtail fescue	5
234, 235, 237: Pedcat	Loamy Saline-Alkali (17f)	Favorable	1,000	Spinescale saltbush	25
		Normal	800	Red brome	20
		Unfavorable	500	Alkali heath	15
				Barley	10
				Iodinebush	5
240: Pleito	Loamy (17e)	Favorable	2,800	Soft chess	40
		Normal	2,400	Wild oat	10
		Unfavorable	1,500	Ripgut brome	5
				Purple needlegrass	5
				Red brome	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
241*:					
Quinto	Shallow Coarse Loamy (15e)	Favorable	1,500	Soft chess	30
		Normal	1,000	California buckwheat	15
		Unfavorable	800	Red brome	10
				Wild oat	5
				Foxtail fescue	5
				Filaree	5
				California sagebrush	5
Ililito	Very Shallow Loamy (15e)	Favorable	1,500	Filaree	30
		Normal	1,000	Soft chess	25
		Unfavorable	500	Foxtail fescue	10
				Red brome	10
				Wild oat	5
Rock outcrop.					
242*:					
Quinto	Shallow Coarse Loamy (15e)	Favorable	1,500	Soft chess	30
		Normal	1,000	California buckwheat	15
		Unfavorable	800	Red brome	10
				Wild oat	5
				Foxtail fescue	5
				Filaree	5
				California sagebrush	5
Millsholm	Shallow Loamy (15e)	Favorable	2,500	Soft chess	20
		Normal	1,800	Filaree	20
		Unfavorable	1,200	Foxtail fescue	20
				Wild oat	5
				Ripgut brome	5
				Clover	5
				Burclover	5
Rock outcrop.					
243*:					
Quinto	Shallow Coarse Loamy (15e)	Favorable	1,500	Soft chess	30
		Normal	1,000	California buckwheat	15
		Unfavorable	800	Red brome	10
				Wild oat	5
				Foxtail fescue	5
				Filaree	5
				California sagebrush	5
Rock outcrop.					
244*:					
Rock outcrop.					
Ararat	Blue Oak-Annual Grass Stony Loam (15e).	Favorable	3,000	Soft chess	25
		Normal	2,000	Wild oat	20
		Unfavorable	1,000	Ripgut brome	10
				Blue oak	10
				Foxtail fescue	5
				Filaree	5
				California buckeye	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
244*:					
Illito	Very Shallow Loamy (15e)	Favorable	1,500	Filaree	30
		Normal	1,000	Soft chess	25
		Unfavorable	500	Foxtail fescue	10
				Red brome	10
				Wild oat	5
245*:					
Rock outcrop.					
Wisflat	Shallow Coarse Loamy (15f)	Favorable	1,200	Red brome	30
		Normal	800	Soft chess	15
		Unfavorable	500	Foxtail fescue	15
				Filaree	10
				Wild oat	5
				California buckwheat	5
				California sagebrush	5
246 San Emigdio	Coarse Loamy (17e)	Favorable	2,000	Soft chess	25
		Normal	1,500	Filaree	15
		Unfavorable	800	Wild oat	10
				Red brome	10
				Ripgut brome	5
				Foxtail barley	5
				Foxtail fescue	5
248 Santanela	Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	40
		Normal	1,800	Iodinebush	20
		Unfavorable	1,000	Baltic rush	10
				Alkali heath	10
				Alkaliweed	5
				Saltbush	5
249 San Timoteo	Coarse Loamy (15e)	Favorable	2,300	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,000	Filaree	15
				Red brome	10
				Ripgut brome	5
				Foxtail fescue	5
250*:					
San Timoteo	Coarse Loamy (15e)	Favorable	2,300	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,000	Filaree	15
				Red brome	10
				Ripgut brome	5
				Foxtail fescue	5
Wisflat	Shallow Coarse Loamy (15f)	Favorable	1,200	Red brome	40
		Normal	800	Soft chess	20
		Unfavorable	500	Foxtail fescue	15
				Filaree	10
				Wild oat	5
251*:					
San Timoteo	Coarse Loamy (15e)	Favorable	2,300	Soft chess	30
		Normal	1,800	Wild oat	15
		Unfavorable	1,000	Filaree	15
				Red brome	10
				Ripgut brome	5
				Foxtail fescue	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
251*:					
Wisflat	Shallow Coarse Loamy (15f)	Favorable	1,200	Red brome	40
		Normal	800	Soft chess	20
		Unfavorable	500	Foxtail fescue	15
				Filaree	10
				Wild oat	5
252*:					
Sehorn	Clayey Low Elevation (15e)	Favorable	2,400	Soft chess	15
		Normal	2,000	Wild oat	15
		Unfavorable	1,400	Filaree	10
				Burclover	10
				Ripgut brome	5
				Clover	5
				Fescue	5
				Barley	5
				Needlegrass	5
Contra Costa	Loamy (15e)	Favorable	3,000	Soft chess	30
		Normal	2,800	Wild oat	20
		Unfavorable	1,500	Burclover	10
				Filaree	10
				California brome	5
				Ripgut brome	5
				Red brome	5
				Clover	5
256 Triangle	Clayey Saline-Alkali Wetland (17f).	Favorable	1,500	Alkali heath	15
		Normal	1,000	Swamp timothy	10
		Unfavorable	600	Knotgrass	10
				Spikerush	10
				Iodinebush	10
				Saltgrass	5
				Cattail	5
				Bulrush	5
				Baltic rush	5
				Pacific alkali bulrush	5
257 Triangle	Clayey Saline-Alkali Wetland (17f).	Favorable	1,200	Swamp timothy	20
		Normal	900	Alkali heath	15
		Unfavorable	600	Saltgrass	10
				Spikerush	10
				Iodinebush	10
				Knotgrass	5
				Cattail	5
				Bulrush	5
				Baltic rush	5
259*:					
Tunehill	Very Shallow Loamy (15e)	Favorable	1,500	Soft chess	35
		Normal	1,000	Filaree	15
		Unfavorable	500	Red brome	15
				Foxtail fescue	15
				Wild oat	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
259*:					
Quiensabe	Blue Oak-Annual Grass Loamy (15e).	Favorable	2,500	Soft chess	40
		Normal	2,000	Wild oat	25
		Unfavorable	1,000	Foxtail fescue	10
				Filaree	10
				Ripgut brome	5
				Blue oak	5
260 Turlock	Loamy Saline-Alkali Wetland (17f).	Favorable	2,500	Saltgrass	30
		Normal	1,800	Iodinebush	10
		Unfavorable	1,000	Alkali heath	10
				Soft chess	10
				Baltic rush	5
				Alkaliweed	5
				Goldfields	5
				Foxtail fescue	5
				Mouse barley	5
262 Turmound	Loamy Saline-Alkali Subirrigated (17f).	Favorable	3,000	Saltgrass	40
		Normal	2,400	Baltic rush	10
		Unfavorable	1,500	Rabbitfootgrass	10
				Mouse barley	5
				Alkali sacaton	5
				Iodinebush	5
				Fathen saltweed	5
263 Vernalis	Loamy (17e)	Favorable	3,000	Soft chess	35
		Normal	2,500	Foxtail barley	15
		Unfavorable	1,000	Red brome	10
				Filaree	10
				Ripgut brome	5
				Foxtail fescue	5
264*:					
Vernalis	Loamy (17e)	Favorable	3,000	Soft chess	35
		Normal	2,500	Foxtail barley	15
		Unfavorable	1,000	Red brome	10
				Filaree	10
				Ripgut brome	5
				Foxtail fescue	5
Pedcat	Loamy Saline-Alkali (17f)	Favorable	1,000	Spinescale saltbush	25
		Normal	800	Red brome	20
		Unfavorable	500	Alkali heath	15
				Barley	10
				Iodinebush	5
265 Volta	Loamy Saline-Alkali Subirrigated (17f).	Favorable	3,000	Saltgrass	40
		Normal	2,400	Mouse barley	10
		Unfavorable	1,500	Alkali sacaton	10
				Alkali heath	10
268*, 269*:					
Wisflat	Shallow Coarse Loamy (15f)	Favorable	1,200	Red brome	40
		Normal	800	Soft chess	20
		Unfavorable	500	Foxtail fescue	15
				Filaree	10
				Wild oat	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
268*, 269*:					
Arburua	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Foxtail fescue	20
		Unfavorable	1,500	Wild oat	10
				Red brome	10
				Filaree	5
				Mouse barley	5
				Ripgut brome	5
270*, 271*, 272*:					
Wisflat	Shallow Coarse Loamy (15f)	Favorable	1,200	Red brome	40
		Normal	800	Soft chess	20
		Unfavorable	500	Foxtail fescue	15
				Filaree	10
				Wild oat	5
Rock outcrop.					
Arburua	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Foxtail fescue	20
		Unfavorable	1,500	Wild oat	10
				Red brome	10
				Filaree	5
				Mouse barley	5
				Ripgut brome	5
273*:					
Wisflat	Shallow Coarse Loamy (15f)	Favorable	1,200	Red brome	40
		Normal	800	Soft chess	20
		Unfavorable	500	Foxtail fescue	15
				Filaree	10
				Wild oat	5
Rock outcrop.					
Oneil	Fine Loamy (15e)	Favorable	3,500	Soft chess	35
		Normal	2,800	Wild oat	15
		Unfavorable	1,500	Ripgut brome	10
				Filaree	10
				Burclover	5
				Red brome	5
286 Yokut	Loamy (17e)	Favorable	3,000	Soft chess	35
		Normal	2,500	Filaree	10
		Unfavorable	1,200	Foxtail barley	10
				Foxtail fescue	5
				Clover	5
				Red brome	5
				Wild oat	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees
112: Ararat	1X	Severe	Severe	Slight	Severe	Blue oak, interior live oak.
113*:						
Ararat	1R	Severe	Severe	Slight	Severe	Blue oak, interior live oak.
Gonzaga	1R	Moderate	Severe	Slight	Severe	Blue oak.
114*:						
Ararat	1X	Severe	Severe	Slight	Severe	Blue oak, interior live oak.
Peckham.						
115*:						
Ararat	1R	Severe	Severe	Slight	Severe	Blue oak, interior live oak.
Peckham.						
182: Fifield	1R	Severe	Severe	Slight	Severe	Blue oak, California live oak.
183*:						
Fifield	1R	Moderate	Severe	Slight	Severe	Blue oak, California live oak.
Gonzaga	1R	Moderate	Severe	Slight	Severe	Blue oak.
184*:						
Fifield	1R	Severe	Severe	Slight	Severe	Blue oak, California live oak.
Honker.						
Gonzaga	1R	Severe	Severe	Slight	Severe	Blue oak.
185*:						
Fifield	1R	Moderate	Severe	Slight	Severe	Blue oak, California live oak.
Millsholm.						
187: Franciscan	1R	Severe	Severe	Slight	Severe	Blue oak, Digger pine.
188*:						
Franciscan	1R	Severe	Severe	Slight	Severe	Blue oak, Digger pine.
Quinto.						
Honker.						

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns				Common trees
		Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	
189*:						
Franciscan	1R	Severe	Severe	Slight	Severe	Blue oak, Digger pine.
Rock outcrop.						
190*:						
Gonzaga	1R	Moderate	Severe	Slight	Severe	Blue oak.
Honker.						
191*:						
Gonzaga	1R	Severe	Severe	Slight	Severe	Blue oak.
Honker.						
202*:						
Laveaga	1R	Severe	Severe	Slight	Severe	Blue oak.
Lecrag	1R	Severe	Severe	Slight	Severe	Blue oak.
203*:						
Laveaga	1R	Severe	Severe	Slight	Severe	Blue oak.
Lecrag	1R	Severe	Severe	Slight	Severe	Blue oak.
204*:						
Laveaga, very stony	1R	Severe	Severe	Slight	Severe	Blue oak.
Laveaga	1R	Severe	Severe	Slight	Severe	Blue oak.
205*:						
Laveaga	1R	Severe	Severe	Slight	Severe	Blue oak.
Hytop.						
216*:						
Millsholm.						
Fifield	1R	Moderate	Severe	Slight	Severe	Blue oak, California live oak.
244*:						
Rock outcrop.						
Ararat	1R	Severe	Severe	Slight	Severe	Blue oak, interior live oak.
Illito.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
101 Agnal	Severe: ponding, percs slowly.	Severe: ponding, excess sodium.	Severe: ponding, percs slowly.	Severe: ponding, erodes easily.	Severe: excess salt, excess sodium, ponding.
102*:					
Akad	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Conosta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
103, 104 Alros	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.	Severe: excess sodium.
105*:					
Altamont Variant	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey, slope.	Severe: slope, too clayey.
Hytop	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
106 Anela	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones, droughty.
107 Anela	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
108 Anela	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
109 Apollo	Slight	Slight	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
110 Apollo	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
111 Apollo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
112 Ararat	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Moderate: large stones, slope, dusty.	Severe: large stones, slope.
113*:					
Ararat	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
113*:					
Gonzaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
114*:					
Ararat	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Moderate: large stones, slope, dusty.	Severe: large stones, slope.
Peckham	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.
115*:					
Ararat	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.
Peckham	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.
116 Arbuckle Variant	Slight	Slight	Moderate: small stones.	Slight	Moderate: droughty.
117 Arburua	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
118 Arburua	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
119 Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
120 Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
121 Asolt	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, too clayey, slope.	Severe: large stones, slope, too clayey.
122 Asolt	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope, too clayey.
123 Ayar	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Severe: too clayey.
124 Ayar	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Severe: too clayey.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
125 Ayar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope, too clayey.
126 Ayar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.
127*:					
Ayar	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Severe: too clayey.
Arburua	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
128*:					
Ayar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope, too clayey.
Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
129*:					
Ayar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.
Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
130*:					
Ayar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.
Oneil	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
131 Ballvar	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
132*:					
Ballvar	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
Pedcat	Severe: percs slowly.	Severe: excess sodium, excess salt.	Severe: percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess salt, excess sodium.
133 Bapos	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
134 Bapos	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
135 Bapos	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
136*:					
Bapos	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Arburua	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
137 Bisgani	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
138 Bisgani	Severe: flooding.	Moderate: percs slowly.	Moderate: flooding, percs slowly.	Slight	Moderate: flooding.
139, 140 Bolfar	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
141, 142 Britto	Severe: wetness, percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Moderate: wetness.	Severe: excess sodium.
143 Britto	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, erodes easily.	Severe: ponding, excess sodium.
144 Capay	Slight	Slight	Slight	Slight	Slight.
145 Capay	Slight	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Severe: too clayey.
146, 147 Carranza	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
148*:					
Carranza	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
Woo	Slight	Slight	Slight	Slight	Slight.
149 Chaqua	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.	Slight.
150 Chateau	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Slight	Severe: excess salt, excess sodium, too clayey.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
151------------------ Chateau	Severe: ponding, excess sodium, excess salt.	Severe: ponding, excess sodium, excess salt.	Severe: ponding, excess sodium, excess salt.	Severe: ponding.	Severe: excess salt, excess sodium, ponding.
152------------------ Checker	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: erodes easily.	Severe: excess salt, excess sodium, droughty.
153------------------ Chinvar	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
154------------------ Cole Variant	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
155------------------ Conosta	Slight----------	Slight----------	Moderate: slope, small stones, depth to rock.	Slight----------	Moderate: large stones, thin layer.
156------------------ Conosta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: large stones, slope, thin layer.
157------------------ Conosta	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
158*:					
Conosta-------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Arburua-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
159, 160------------- Contra Costa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
161------------------ Damluis	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
162------------------ Damluis	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
163, 164------------- Damluis	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, large stones.
165------------------ Damluis	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, large stones, slope.
166------------------ Damluis Variant	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Moderate: thin layer.
167------------------ Deldota	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
168------------------ Dosamigos	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight----------	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
169 Dosamigos	Moderate: percs slowly.	Moderate: percs slowly.	Severe: too clayey.	Moderate: too clayey.	Severe: too clayey.
170 Dospalos	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
171 Dospalos	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
172 Dospalos	Severe: too clayey, excess salt.	Severe: too clayey, excess salt.	Severe: too clayey, excess salt.	Severe: too clayey.	Severe: excess salt, too clayey.
173*:					
Dospalos	Severe: flooding, too clayey, excess salt.	Severe: too clayey, excess salt.	Severe: too clayey, excess salt.	Severe: too clayey.	Severe: excess salt, too clayey.
Bolfar	Severe: flooding.	Moderate: percs slowly.	Moderate: flooding, percs slowly.	Slight	Moderate: flooding.
174*:					
Dospalos	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Urban land.					
175 Edminster	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
176*:					
Edminster	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
Kesterson	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
177 Edminster Variant	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
178 Elnido	Slight	Slight	Slight	Slight	Moderate: droughty.
179 Elnido	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
180 Elnido	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
181 Escano	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
182 Fifield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
183*:					
Fifield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Gonzaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
184*:					
Fifield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty. slope.
Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gonzaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
185*:					
Fifield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
186. Fluvaquents					
187 Franciscan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
188*:					
Franciscan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Quinto	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
189*:					
Franciscan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
190*, 191*:					
Gonzaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
190*, 191*:					
Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
192 Henmel	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
193 Herito	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Severe: erodes easily.	Slight.
194, 195 Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
196*:					
Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
197*:					
Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Quinto	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
198 Kesterson	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
199, 200 Kesterson	Severe: ponding, percs slowly.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, erodes easily.	Severe: excess sodium, ponding.
201*:					
Kesterson	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
Edminster	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
202*, 203*:					
Laveaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lecrag	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
204*:					
Laveaga, very stony	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Laveaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
205*:					
Laveaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hytop	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
206 Los Banos	Slight	Slight	Moderate: small stones.	Slight	Slight.
207 Los Banos	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
208 Los Banos	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
209*:					
Los Banos	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Pleito	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
210 Los Banos Variant	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
211 Marcuse	Severe: wetness, too clayey.	Severe: too clayey, excess salt.	Severe: too clayey, wetness, excess salt.	Severe: too clayey.	Severe: excess salt, too clayey.
212 Marcuse	Severe: too clayey, excess sodium.	Severe: too clayey, excess sodium, excess salt.	Severe: too clayey, excess sodium, excess salt.	Severe: too clayey.	Severe: excess salt, excess sodium, too clayey.
213 Millsholm	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: thin layer.
214, 215 Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
216*:					
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
216*:					
Fifield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
217*:					
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Honker	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
218*:					
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
219*:					
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
220. Mollic Xerofluvents					
221 Oneil	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
222 Oneil	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
223 Oneil	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
224 Oquin	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: thin layer.
225 Oquin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
226 Orognen	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
227*:					
Orognen	Severe: slope.	Severe: slope.	Severe: slope, percs slowly.	Severe: slope, erodes easily.	Severe: slope.
Quiensabe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
228------------------ Palazzo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight----------	Slight.
229------------------ Paver	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
230------------------ Paver	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
231------------------ Peckham	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.	Severe: large stones.
232------------------ Peckham	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.
233*:					
Peckham--------------	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.
Cole Variant---------	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
234, 235, 236--------- Pedcat	Severe: percs slowly.	Severe: excess sodium, excess salt.	Severe: percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess salt, excess sodium.
237------------------ Pedcat	Severe: percs slowly, too clayey.	Severe: too clayey, excess sodium, excess salt.	Severe: too clayey, percs slowly, excess sodium.	Severe: too clayey.	Severe: excess salt, excess sodium, too clayey.
238*. Pits					
239------------------ Pleito	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, large stones, slope.
240------------------ Pleito	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
241*:					
Quinto---------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Illito---------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, thin layer.
Rock outcrop.					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
242*:					
Quinto	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Millsholm	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
243*:					
Quinto	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
244*:					
Rock outcrop.					
Ararat	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.
Illito	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.	Severe: large stones, slope, thin layer.
245*:					
Rock outcrop.					
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
246 San Emigdio	Slight	Slight	Slight	Slight	Slight.
247 San Emigdio	Slight	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
248 Santanela	Severe: ponding, excess sodium.	Severe: ponding, excess sodium.	Severe: ponding, excess sodium.	Severe: ponding, erodes easily.	Severe: excess sodium, ponding.
249 San Timoteo	Slight	Slight	Moderate: slope, small stones, depth to rock.	Severe: erodes easily.	Moderate: thin layer.
250*:					
San Timoteo	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
250*:					
Wisflat	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: thin layer.
251*:					
San Timoteo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, thin layer.
252*:					
Sehorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too clayey.
Contra Costa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
253, 254 Stanislaus	Slight	Slight	Slight	Slight	Slight.
255*:					
Stanislaus	Slight	Slight	Slight	Slight	Slight.
Dosamigos	Moderate: percs slowly.	Moderate: percs slowly.	Severe: too clayey.	Moderate: too clayey.	Severe: too clayey.
Urban land.					
256, 257 Triangle	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, too clayey, excess sodium.	Severe: too clayey, ponding, excess sodium.	Severe: ponding, too clayey, erodes easily.	Severe: excess sodium, ponding, too clayey.
258 Trulae	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
259*:					
Tunehill	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Quiensabe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
260, 261 Turlock	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, erodes easily.	Severe: excess sodium, ponding.
262 Turmound	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: erodes easily.	Severe: excess salt, excess sodium, ponding.
263 Vernalis	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
264*:					
Vernalis	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.	Slight.
Pedcat	Severe: percs slowly.	Severe: excess sodium, excess salt.	Severe: percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess salt, excess sodium.
265 Volta	Severe: wetness, percs slowly.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
266 Volta	Severe: percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: percs slowly, excess sodium.	Severe: erodes easily.	Severe: excess sodium.
267 Wekoda	Severe: percs slowly, too clayey, excess sodium.	Severe: too clayey, excess sodium, percs slowly.	Severe: too clayey, percs slowly, excess sodium.	Severe: too clayey.	Severe: excess sodium, too clayey.
268*:					
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, thin layer.
Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
269*:					
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
270*:					
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
271*, 272*:					
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
Arburua	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
273*:					
Wisflat	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, thin layer.
Rock outcrop.					
Oneil	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
274, 275 Woo	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
276, 277 Woo	Slight	Slight	Slight	Slight	Slight.
278 Woo	Slight	Slight	Moderate: slope.	Slight	Slight.
279 Woo	Slight	Slight	Slight	Slight	Slight.
280 Woo	Moderate: too clayey.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.	Severe: too clayey.
281*:					
Woo	Slight	Slight	Slight	Slight	Slight.
Anela	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones, droughty.
Urban land.					
282*:					
Woo loam	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.	Slight.
Woo clay loam	Slight	Slight	Slight	Slight	Slight.
Urban land.					
283, 284. Xerofluvents					
285 Yokut	Slight	Slight	Moderate: small stones.	Severe: erodes easily.	Moderate: droughty.
286 Yokut	Severe: flooding.	Moderate: dusty.	Moderate: small stones, dusty.	Severe: erodes easily.	Moderate: droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
101---------------- Agnal	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	---	---	Fair	Very poor.
102*:											
Akad---------------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Very poor.
Conosta-----------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
103, 104---------- Alros	Fair	Fair	Good	Poor	Fair	Good	Fair	Fair	---	Fair	---
105*:											
Altamont Variant--	Very poor.	Fair	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
Hytop------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
106, 107, 108------ Anela	Good	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	---	---	Fair.
109, 110, 111------ Apollo	Good	Good	Good	Fair	Good	Poor	Very poor.	Good	---	Poor	Good.
112---------------- Ararat	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	---	---	Fair.
113*:											
Ararat------------	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Gonzaga-----------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
114*:											
Ararat------------	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Peckham-----------	Poor	Fair	Good	Poor	Poor	Very poor.	Very poor.	---	---	---	Fair.
115*:											
Ararat------------	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Peckham-----------	Very poor.	Poor	Good	Poor	Poor	Very poor.	Very poor.	---	---	---	Fair.
116---------------- Arbuckle Variant	Good	Good	Good	Poor	Good	Good	Fair	Good	---	Fair	---
117, 118----------- Arburua	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
119 Arburua	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
120 Arburua	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
121, 122 Asolt	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---	---	Fair.
123, 124 Ayar	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Very poor.	Fair	---	---	Fair.
125 Ayar	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
126 Ayar	Poor	Fair	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
127*:											
Ayar	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Very poor.	Fair	---	---	Fair.
Arburua	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
128*:											
Ayar	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
Arburua	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
129*:											
Ayar	Poor	Fair	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
Arburua	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
130*:											
Ayar	Poor	Fair	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
Oneil	Very poor.	Very poor.	Good	Very poor.	Fair	Very poor.	Very poor.	---	---	---	Fair.
131 Ballvar	Fair	Good	Good	Fair	Good	Poor	Very poor.	Fair	---	Very poor.	Good.
132*:											
Ballvar	Fair	Good	Good	Fair	Good	Poor	Very poor.	Fair	---	Very poor.	Good.
Pedcat	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	---	Fair	Very poor.
133 Bapos	Fair	Good	Good	Very poor.	Poor	Poor	Poor	Fair	---	Poor	---

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
134, 135----------- Bapos	Fair	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
136*:											
Bapos-------------	Fair	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Fair	---	---	Fair.
Arburua-----------	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
137---------------- Bisgani	Good	Good	Good	Poor	Fair	Good	Poor	Good	---	Fair	---
138---------------- Bisgani	Poor	Fair	Fair	Very poor.	Poor	Good	Poor	Fair	---	Fair	Fair.
139---------------- Bolfar	Good	Good	Good	Fair	Good	Good	Good	Good	---	Good	---
140---------------- Bolfar	Poor	Fair	Fair	Poor	Fair	Good	Fair	Fair	---	Fair	Fair.
141---------------- Britto	Very poor.	Very poor.	Poor	Poor	Poor	Good	Good	Very poor.	---	Good	Poor.
142---------------- Britto	Fair	Fair	Fair	Poor	Fair	Good	Good	Fair	---	Good	---
143---------------- Britto	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	---	Good	---
144, 145----------- Capay	Good	Good	Good	Very poor.	Very poor.	Good	Good	Fair	---	Good	---
146, 147----------- Carranza	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
148*:											
Carranza----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	---	Very poor.	---
Woo---------------	Good	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	---	Very poor.	---
149---------------- Chaqua	Fair	Good	Good	Poor	Fair	Poor	Poor	Fair	---	Poor	Good.
150---------------- Chateau	Good	Good	Good	Very poor.	Fair	Fair	Fair	Good	---	Fair	---
151---------------- Chateau	Poor	Poor	Fair	Very poor.	Poor	Fair	Good	Poor	---	Good	---
152---------------- Checker	Very poor.	Very poor.	Fair	Very poor.	Poor	Poor	Fair	Very poor.	---	Poor	Poor.
153---------------- Chinvar	Good	Good	Good	Fair	Fair	Good	Fair	Good	---	Fair	---

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
154----------------- Cole Variant	Good	Good	Good	Fair	Good	Poor	Very poor.	Good	---	Very poor.	Good.
155, 156------------ Conosta	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Good.
157----------------- Conosta	Poor	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Good.
158*:											
Conosta------------	Poor	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Good.
Arburua------------	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
159----------------- Contra Costa	Very poor.	Fair	Good	Fair	Good	Very poor.	Very poor.	Poor	Fair	---	Good.
160----------------- Contra Costa	Very poor.	Very poor.	Good	Fair	Good	Very poor.	Very poor.	Very poor.	Fair	---	Good.
161----------------- Damluis	Good	Good	Good	Very poor.	Poor	Good	Good	Good	---	Good	---
162----------------- Damluis	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Good	---	Very poor.	Fair.
163----------------- Damluis	Good	Good	Good	Very poor.	Poor	Good	Good	Good	---	Good	---
164, 165------------ Damluis	Good	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Good	---	Very poor.	Fair.
166----------------- Damluis Variant	Fair	Fair	Good	Very poor.	Poor	Good	Fair	Fair	---	Fair	---
167----------------- Deldota	Fair	Good	Good	Very poor.	Very poor.	Fair	Fair	Fair	---	Fair	---
168----------------- Dosamigos	Good	Good	Good	Fair	Fair	Fair	Fair	Good	---	Fair	---
169----------------- Dosamigos	Good	Good	Good	Poor	Poor	Fair	Fair	Good	---	Fair	---
170, 171------------ Dospalos	Good	Good	Good	Fair	Fair	Good	Fair	Good	---	Good	---
172----------------- Dospalos	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Fair	---	Fair	Poor.
173*:											
Dospalos-----------	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Fair	---	Fair	Poor.
Bolfar-------------	Poor	Fair	Fair	Poor	Fair	Good	Fair	Fair	---	Fair	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
174*:											
Dospalos	Good	Good	Good	Fair	Fair	Good	Fair	Good	---	Good	---
Urban land.											
175 Edminster	Very poor.	Very poor.	Poor	Very poor.	Poor	Good	Fair	Very poor.	---	Fair	Poor.
176*:											
Edminster	Very poor.	Very poor.	Poor	Very poor.	Poor	Good	Fair	Very poor.	---	Fair	Poor.
Kesterson	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good	Fair	Poor	---	Fair	Poor.
177 Edminster Variant	Poor	Poor	Fair	Poor	Poor	Good	Fair	Poor	---	Fair	Poor.
178 Elnido	Good	Good	Good	Fair	Good	Good	Poor	Good	---	Fair	---
179 Elnido	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	---	Good	Fair.
180 Elnido	Good	Good	Good	Fair	Good	Good	Poor	Good	---	Fair	---
181 Escano	Good	Good	Good	Good	Good	Good	Fair	Good	---	Good	---
182 Fifield	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
183*:											
Fifield	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Gonzaga	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
184*:											
Fifield	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Honker	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
Gonzaga	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
185*:											
Fifield	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Millsholm	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
186. Fluvaquents											

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
187-----------------Franciscan	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
188*:											
Franciscan----------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
Quinto-------------	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Honker-------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
189*:											
Franciscan----------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
Rock outcrop.											
190*, 191*:											
Gonzaga------------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Poor	---	Fair.
Honker-------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
192-----------------Henmel	Good	Good	Good	Poor	Poor	Good	Fair	Fair	---	Fair	---
193-----------------Herito	Fair	Good	Good	Very poor.	Fair	Poor	Very poor.	Fair	---	Poor	Good.
194, 195------------Honker	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
196*:											
Honker-------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
Millsholm----------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
Rock outcrop.											
197*:											
Honker-------------	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
Quinto-------------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
198-----------------Kesterson	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good	Fair	Poor	---	Fair	Poor.
199, 200------------Kesterson	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good	Fair	Poor	---	Fair	Poor.
201*:											
Kesterson----------	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Good	Fair	Poor	---	Fair	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
201*:											
Edminster	Very poor.	Very poor.	Poor	Very poor.	Poor	Good	Fair	Very poor.	---	Fair	Poor.
202*, 203*:											
Laveaga	Very poor.	Very poor.	Good	Fair	Good	Very poor.	Very poor.	---	Fair	---	Good.
Lecrag	Very poor.	Very poor.	Good	Poor	Poor	Very poor.	Very poor.	---	Poor	---	Fair.
204*:											
Laveaga, very stony	Very poor.	Very poor.	Good	Fair	Good	Very poor.	Very poor.	---	Fair	---	Good.
Laveaga	Very poor.	Very poor.	Good	Fair	Good	Very poor.	Very poor.	---	Fair	---	Good.
205*:											
Laveaga	Very poor.	Very poor.	Good	Fair	Good	Very poor.	Very poor.	---	Fair	---	Good.
Hytop	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
206 Los Banos	Good	Good	Good	Poor	Very poor.	Poor	Poor	Fair	---	Poor	---
207, 208 Los Banos	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Fair	---	Very poor.	---
209*:											
Los Banos	Good	Good	Good	Poor	Very poor.	Poor	Very poor.	Fair	---	Very poor.	---
Pleito	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	---	Very poor.	---
210 Los Banos Variant	Good	Good	Good	Poor	Fair	Poor	Very poor.	Good	---	Very poor.	---
211 Marcuse	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Good	Very poor.	---	Fair	Very poor.
212 Marcuse	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Good	Fair	---	Fair	---
213, 214, 215 Millsholm	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
216*:											
Millsholm	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
Fifield	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
217*:											
Millsholm	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
Honker	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
Rock outcrop.											
218*, 219*:											
Millsholm	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
Rock outcrop.											
220. Mollic Xerofluvents											
221 Oneil	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
222 Oneil	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
223 Oneil	Very poor.	Very poor.	Good	Very poor.	Fair	Very poor.	Very poor.	Poor	---	---	Fair.
224, 225 Oquin	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
226 Orognen	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
227*:											
Orognen	Very poor.	Very poor.	Good	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Fair.
Quiensabe	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
228 Palazzo	Good	Good	Good	Fair	Good	Good	Poor	Good	---	Fair	---
229 Paver	Good	Good	Good	Fair	Good	Fair	Poor	Good	---	Poor	---
230 Paver	Good	Good	Good	Fair	Good	Poor	Very poor.	Good	---	Very poor.	---
231, 232 Peckham	Poor	Fair	Good	Poor	Poor	Very poor.	Very poor.	Poor	---	---	Fair.
233*:											
Peckham	Poor	Fair	Good	Poor	Poor	Very poor.	Very poor.	Poor	---	---	Fair.
Cole Variant	Good	Good	Good	Fair	Good	Poor	Very poor.	Good	---	Very poor.	Good.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
234, 235----------- Pedcat	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	---	Fair	Very poor.
236---------------- Pedcat	Fair	Fair	Poor	Very poor.	Poor	Fair	Fair	Fair	---	Fair	---
237---------------- Pedcat	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	---	Fair	Very poor.
238*. Pits											
239, 240----------- Pleito	Poor	Fair	Good	Very poor.	Fair	Very poor.	Very poor.	Fair	---	---	Good.
241*:											
Quinto------------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Illito------------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Poor.
Rock outcrop.											
242*:											
Quinto------------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Millsholm---------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
Rock outcrop.											
243*:											
Quinto------------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Rock outcrop.											
244*: Rock outcrop.											
Ararat------------	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
Illito------------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Poor.
245*: Rock outcrop.											
Wisflat-----------	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
246, 247----------- San Emigdio	Good	Good	Good	Fair	Good	Poor	Very poor.	Good	---	Very poor.	---
248---------------- Santanela	Very poor.	Poor	Poor	Very poor.	Poor	Good	Fair	Poor	---	Fair	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
249-----------------San Timoteo	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
250*, 251*:											
San Timoteo--------	Fair	Good	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
Wisflat------------	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
252*:											
Sehorn-------------	Very poor.	Very poor.	Good	Very poor.	Very poor.	Very poor.	Very poor.	---	---	---	Fair.
Contra Costa-------	Very poor.	Fair	Good	Fair	Good	Very poor.	Very poor.	---	---	---	Good.
253, 254------------Stanislaus	Good	Good	Good	Poor	Fair	Good	Fair	Good	---	Fair	---
255*:											
Stanislaus---------	Good	Good	Good	Poor	Fair	Good	Fair	Good	---	Fair	---
Dosamigos----------	Good	Good	Good	Poor	Poor	Fair	Fair	Good	---	Fair	---
Urban land.											
256, 257------------Triangle	Poor	Fair	Poor	Very poor.	Poor	Good	Fair	Poor	---	Fair	Poor.
258-----------------Trulae	Poor	Fair	Poor	Very poor.	Very poor.	Good	Good	Poor	---	Fair	---
259*:											
Tunehill-----------	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	---	---	---	Poor.
Quiensabe----------	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	Fair	---	Fair.
260, 261------------Turlock	Poor	Fair	Poor	Very poor.	Poor	Good	Fair	Poor	---	Fair	Poor.
262-----------------Turmound	Very poor.	Poor	Poor	Very poor.	Poor	Fair	Fair	Poor	---	Fair	Poor.
263-----------------Vernalis	Good	Good	Good	Fair	Good	Fair	Poor	Good	---	Poor	---
264*:											
Vernalis-----------	Good	Good	Good	Fair	Good	Fair	Poor	Good	---	Poor	---
Pedcat-------------	Very poor.	Very poor.	Poor	Very poor.	Poor	Fair	Fair	Very poor.	---	Fair	---
265-----------------Volta	Very poor.	Very poor.	Fair	Very poor.	Fair	Good	Fair	Poor	---	Fair	Fair.
266-----------------Volta	Fair	Fair	Fair	Very poor.	Fair	Good	Fair	Poor	---	Fair	---

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
267 Wekoda	Fair	Good	Fair	Very poor.	Very poor.	Good	Fair	Fair	---	Fair	---
268*:											
Wisflat	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Arburua	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
269*:											
Wisflat	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Arburua	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
270*:											
Wisflat	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Rock outcrop.											
Arburua	Poor	Fair	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
271*, 272*:											
Wisflat	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Rock outcrop.											
Arburua	Very poor.	Very poor.	Good	Poor	Fair	Very poor.	Very poor.	---	---	---	Fair.
273*:											
Wisflat	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.	---	---	---	Poor.
Rock outcrop.											
Oneil	Very poor.	Very poor.	Good	Very poor.	Fair	Very poor.	Very poor.	Fair	---	---	Fair.
274, 275, 276, 277, 278 Woo	Good	Good	Good	Fair	Fair	Good	Poor	Good	---	Fair	---
279 Woo	Good	Good	Good	Fair	Fair	Good	Fair	Good	---	Fair	---
280 Woo	Good	Good	Good	Fair	Fair	Good	Poor	Good	---	Fair	---
281*:											
Woo	Good	Good	Good	Fair	Fair	Good	Very poor.	Good	---	Very poor.	---

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
281*:											
Anela	Good	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	---	Very poor.	---
Urban land.											
282*:											
Woo loam	Good	Good	Good	Fair	Fair	Good	Poor	Good	---	Fair	---
Woo clay loam	Good	Good	Good	Fair	Fair	Good	Fair	Good	---	Fair	---
Urban land.											
283, 284. Xerofluvents											
285, 286 Yokut	Good	Good	Good	Poor	Poor	Poor	Very poor.	Fair	---	Poor	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
101 Agnal	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: excess salt, excess sodium, ponding.
102*:						
Akad	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Conosta	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
103, 104 Alros	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Severe: excess sodium.
105*:						
Altamont Variant	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
Hytop	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
106 Anela	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: small stones, large stones, droughty.
107 Anela	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: small stones.
108 Anela	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
109 Apollo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
110 Apollo	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
111 Apollo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
112 Ararat	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
113*:						
Ararat	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Gonzaga	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
114*, 115*:						
Ararat	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Peckham	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
116 Arbuckle Variant	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
117 Arburua	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Moderate: depth to rock, shrink-swell.	Moderate: thin layer.
118 Arburua	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, shrink-swell.	Moderate: slope, thin layer.
119, 120 Arburua	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
121, 122 Asolt	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: large stones, slope, too clayey.
123 Ayar	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
124 Ayar	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: too clayey.
125, 126 Ayar	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
127*:						
Ayar	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
127*:						
Arburua	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, shrink-swell.	Moderate: slope, thin layer.
128*, 129*:						
Ayar	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
Arburua	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
130*:						
Ayar	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
Oneil	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
131 Ballvar	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
132*:						
Ballvar	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
Pedcat	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium.
133, 134 Bapos	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
135 Bapos	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
136*:						
Bapos	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Arburua	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, shrink-swell.	Moderate: slope, thin layer.
137 Bisgani	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
138 Bisgani	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
139, 140 Bolfar	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
141, 142 Britto	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Severe: excess sodium.
143 Britto	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding, excess sodium.
144 Capay	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
145 Capay	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
146 Carranza	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones.
147 Carranza	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: small stones.
148*:						
Carranza	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones.
Woo	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
149 Chaqua	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
150 Chateau	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium, too clayey.
151 Chateau	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: excess salt, excess sodium, ponding.
152 Checker	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Severe: excess salt, excess sodium, droughty.
153 Chinvar	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Slight.
154 Cole Variant	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
155--------------- Conosta	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: large stones, thin layer.
156--------------- Conosta	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: large stones, slope, thin layer.
157--------------- Conosta	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
158*:						
Conosta----------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Arburua----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
159, 160---------- Contra Costa	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
161, 162---------- Damluis	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
163, 164---------- Damluis	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: small stones, large stones.
165--------------- Damluis	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: small stones, large stones, slope.
166--------------- Damluis Variant	Severe: cemented pan.	Severe: shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: cemented pan.
167--------------- Deldota	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: too clayey.
168--------------- Dosamigos	Moderate: too clayey, wetness.	Severe: shrink-swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
169--------------- Dosamigos	Moderate: too clayey, wetness.	Severe: shrink-swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
170--------------- Dospalos	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
171--------------- Dospalos	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
172--------------- Dospalos	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, too clayey.
173*:						
Dospalos----------	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: excess salt, too clayey.
Bolfar------------	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
174*:						
Dospalos----------	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
Urban land.						
175--------------- Edminster	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Severe: excess sodium.
176*:						
Edminster---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Severe: excess sodium.
Kesterson---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: excess sodium.
177--------------- Edminster Variant	Severe: cutbanks cave.	Slight----------	Moderate: wetness.	Slight----------	Slight----------	Moderate: droughty, too sandy.
178--------------- Elnido	Severe: cutbanks cave.	Slight----------	Moderate: wetness.	Slight----------	Slight----------	Moderate: droughty.
179--------------- Elnido	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
180--------------- Elnido	Severe: cutbanks cave.	Slight----------	Moderate: wetness.	Slight----------	Slight----------	Slight.
181--------------- Escano	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Severe: low strength.	Slight.
182--------------- Fifield	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
183*:						
Fifield	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Gonzaga	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
184*:						
Fifield	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Gonzaga	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
185*:						
Fifield	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
186. Fluvaquents						
187 Franciscan	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
188*:						
Franciscan	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Quinto	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
189*:						
Franciscan	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
190*, 191*:						
Gonzaga	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
192 Henmel	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
193 Herito	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
194, 195 Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
196*:						
Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
197*:						
Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Quinto	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
198 Kesterson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: excess sodium.
199, 200 Kesterson	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess sodium, ponding.
201*:						
Kesterson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: excess sodium.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
201*:						
Edminster	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Severe: excess sodium.
202*, 203*:						
Laveaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lecrag	Severe: cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
204*						
Laveaga, very stony	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Laveaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
205*:						
Laveaga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hytop	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
206, 207 Los Banos	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
208 Los Banos	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
209*:						
Los Banos	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Pleito	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Moderate: large stones.
210 Los Banos Variant	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones, droughty.
211 Marcuse	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, too clayey.
212 Marcuse	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium, too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
213: Millsholm	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
214, 215: Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
216*:						
Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Fifield	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
217*:						
Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Honker	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Rock outcrop.						
218*, 219*:						
Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
220. Mollic Xerofluvents						
221: Oneil	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.	Moderate: slope, thin layer.
222, 223: Oneil	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
224: Oquin	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: thin layer.
225: Oquin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
226: Orognen	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
227*:						
Orognen	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Quiensabe	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
228 Palazzo	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
229, 230 Paver	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
231 Peckham	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
232 Peckham	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.
233*:						
Peckham	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Cole Variant	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
234, 235, 236 Pedcat	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium.
237 Pedcat	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium, too clayey.
238*. Pits						
239 Pleito	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: small stones, large stones, slope.
240 Pleito	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
241*:						
Quinto	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
241*:						
Illito	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, slope, thin layer.
Rock outcrop.						
242*:						
Quinto	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Millsholm	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
243*:						
Quinto	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
244*:						
Rock outcrop.						
Ararat	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Illito	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: large stones, slope, thin layer.
245*:						
Rock outcrop.						
Wisflat	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
246, 247 San Emigdio	Slight	Slight	Slight	Slight	Slight	Slight.
248 Santanela	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess sodium, ponding.
249 San Timoteo	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: thin layer.
250*:						
San Timoteo	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
250*:						
Wisflat----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
251*:						
San Timoteo------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wisflat----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
252*:						
Sehorn-----------	Severe: depth to rock, cutbanks cave, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, too clayey.
Contra Costa-----	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
253--------------- Stanislaus	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
254--------------- Stanislaus	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
255*:						
Stanislaus-------	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Dosamigos--------	Moderate: too clayey, wetness.	Severe: shrink-swell.	Moderate: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
Urban land.						
256, 257---------- Triangle	Severe: cutbanks cave, ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: excess sodium, ponding, too clayey.
258--------------- Trulae	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too clayey.
259*:						
Tunehill---------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, thin layer.
Quiensabe--------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
260, 261: Turlock	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess sodium, ponding.
262: Turmound	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: excess salt, excess sodium, ponding.
263: Vernalis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
264*:						
Vernalis	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Pedcat	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess salt, excess sodium.
265: Volta	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
266: Volta	Moderate: cemented pan, too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium.
267: Wekoda	Severe: cutbanks cave, wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: excess sodium, too clayey.
268*, 269*:						
Wisflat	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Arburua	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
270*, 271*, 272*:						
Wisflat	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						
Arburua	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
273*:						
Wisflat	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Rock outcrop.						

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
273*:						
Oneil------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
274--------------- Woo	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
275, 276---------- Woo	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
277, 278---------- Woo	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
279--------------- Woo	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
280--------------- Woo	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Severe: too clayey.
281*:						
Woo--------------	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Anela------------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: small stones, large stones, droughty.
Urban land.						
282*:						
Woo loam---------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Woo clay loam----	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
Urban land.						
283, 284. Xerofluvents						
285--------------- Yokut	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: droughty.
286--------------- Yokut	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, shrink-swell.	Moderate: droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101: Agnal	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
102**:					
Akad	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Conosta	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
103, 104: Alros	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: excess sodium.	Slight	Poor: excess sodium.
105**:					
Altamont Variant	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Hytop	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
106, 107: Anela	Moderate: percs slowly.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Poor: small stones.
108: Anela	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
109: Apollo	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, too clayey.
110: Apollo	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: area reclaim, too clayey, slope.
111: Apollo	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
112: Ararat	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
113**:					
Ararat	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
Gonzaga	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
114**, 115**:					
Ararat	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
Peckham	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
116: Arbuckle Variant	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
117: Arburua	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
118: Arburua	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
119, 120: Arburua	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim. slope.
121, 122: Asolt	Severe: percs slowly, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, large stones.
123: Ayar	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
124: Ayar	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
125, 126: Ayar	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
127**:					
Ayar	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Arburua	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
128**, 129**:					
Ayar	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Arburua	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
130**:					
Ayar	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Oneil	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
131 Ballvar	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
132**:					
Ballvar	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Pedcat	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess sodium.	Moderate: wetness.	Poor: too clayey, excess salt, excess sodium.
133 Bapos	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
134 Bapos	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
135 Bapos	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
136**:					
Bapos	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
136**:					
Arburua	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
137 Bisgani	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
138 Bisgani	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
139 Bolfar	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.	Slight	Good.
140 Bolfar	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Slight	Fair: wetness.
141, 142 Britto	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, wetness, excess salt.
143 Britto	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, ponding, excess salt.
144 Capay	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
145 Capay	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
146 Carranza	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey, large stones.	Slight	Poor: small stones.
147 Carranza	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey, large stones.	Slight	Poor: small stones.
148**:					
Carranza	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Woo	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey.
149 Chaqua	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: area reclaim, too clayey, thin layer.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
150 Chateau	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: too clayey, excess sodium.	Slight	Poor: too clayey, hard to pack, excess sodium.
151 Chateau	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
152 Checker	Severe: wetness, percs slowly.	Severe: wetness.	Severe: excess sodium, excess salt.	Slight	Poor: excess salt, excess sodium.
153 Chinvar	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
154 Cole Variant	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Slight	Poor: too clayey.
155 Conosta	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
156 Conosta	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
157 Conosta	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
158**:					
Conosta	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Arburua	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
159, 160 Contra Costa	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
161 Damluis	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
162 Damluis	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
163 Damluis	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack, small stones.
164 Damluis	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack, small stones.
165 Damluis	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack, small stones.
166 Damluis Variant	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan, seepage, too clayey.	Severe: cemented pan.	Poor: area reclaim, too clayey, hard to pack.
167 Deldota	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
168, 169 Dosamigos	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
170, 171 Dospalos	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
172 Dospalos	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
173**:					
Dospalos	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
Bolfar	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: wetness.
174**:					
Dospalos	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Urban land.					
175 Edminster	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
176**:					
Edminster	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
Kesterson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
177 Edminster Variant	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Moderate: wetness.	Severe: seepage.	Fair: wetness.
178 Elnido	Severe: wetness.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
179 Elnido	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage.	Fair: wetness.
180 Elnido	Severe: wetness.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
181 Escano	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
182 Fifield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, seepage, small stones.
183**:					
Fifield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, seepage, small stones.
Gonzaga	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
184**:					
Fifield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, seepage, small stones.
Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Gonzaga	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
185**:					
Fifield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, seepage, small stones.
Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
186. Fluvaquents					
187 Franciscan	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
188**:					
Franciscan	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Quinto	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
189**:					
Franciscan	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
190**, 191**:					
Gonzaga	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
192 Henmel	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
193 Herito	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
194, 195 Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
196**:					
Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
197**:					
Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Quinto	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
198 Kesterson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
199, 200 Kesterson	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, excess sodium.	Severe: ponding.	Poor: ponding, excess sodium.
201**:					
Kesterson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
Edminster	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
202**, 203**:					
Laveaga	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.
Lecrag	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
204**:					
Laveaga, very stony	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
204**:					
Laveaga	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.
205**:					
Laveaga	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.
Hytop	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
206 Los Banos	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
207 Los Banos	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
208 Los Banos	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
209**:					
Los Banos	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Pleito	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
210 Los Banos Variant	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
211 Marcuse	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess salt.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
212 Marcuse	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, excess sodium.
213 Millsholm	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
214, 215 Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
216**:					
Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
216**:					
Fifield	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, seepage, small stones.
217**:					
Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Honker	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
218**, 219**:					
Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
220. Mollic Xerofluvents					
221 Oneil	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
222, 223 Oneil	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
224 Oquin	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
225 Oquin	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
226 Orognen	Severe: percs slowly.	Severe: seepage.	Moderate: too clayey.	Severe: seepage.	Poor: small stones.
227**:					
Orognen	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
Quiensabe	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
228 Palazzo	Severe: wetness, percs slowly.	Severe: seepage.	Moderate: wetness, too clayey.	Severe: seepage.	Fair: too clayey.
229 Paver	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
230 Paver	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
231 Peckham	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, large stones.
232 Peckham	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: area reclaim, large stones.
233**:					
Peckham	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Cole Variant	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Slight	Poor: too clayey.
234, 235, 236, 237 Pedcat	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess sodium.	Moderate: wetness.	Poor: too clayey, excess salt, excess sodium.
238**. Pits					
239 Pleito	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: small stones.
240 Pleito	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
241**:					
Quinto	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Illito	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
242**:					
Quinto	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Millsholm	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
243**:					
Quinto	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
244**:					
Rock outcrop.					
Ararat	Severe: percs slowly, slope, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: large stones, slope.
Illito	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
245**:					
Rock outcrop.					
Wisflat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
246, 247 San Emigdio	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
248 Santanela	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, excess sodium.	Severe: ponding.	Poor: ponding, excess sodium.
249 San Timoteo	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
250**:					
San Timoteo	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
250**:					
Wisflat	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: area reclaim.
251**:					
San Timoteo	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Wisflat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
252**:					
Sehorn	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Contra Costa	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
253 Stanislaus	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
254 Stanislaus	Severe: percs slowly.	Moderate: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
255**:					
Stanislaus	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
Dosamigos	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Urban land.					
256, 257 Triangle	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
258 Trulae	Severe: percs slowly.	Moderate: wetness.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
259**:					
Tunehill	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
259**:					
Quiensabe	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
260, 261 Turlock	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, excess sodium, excess salt.	Severe: ponding.	Poor: ponding, excess salt, excess sodium.
262 Turmound	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, excess sodium.	Severe: seepage.	Poor: excess sodium.
263 Vernalis	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
264**:					
Vernalis	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Pedcat	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess sodium.	Moderate: wetness.	Poor: too clayey, excess salt, excess sodium.
265 Volta	Severe: wetness, percs slowly.	Severe: wetness.	Severe: cemented pan, wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness, excess sodium.
266 Volta	Severe: wetness, percs slowly.	Moderate: cemented pan, wetness.	Severe: cemented pan, too clayey.	Moderate: cemented pan.	Poor: too clayey, hard to pack, excess sodium.
267 Wekoda	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, excess sodium.	Moderate: wetness.	Poor: too clayey, hard to pack, excess sodium.
268**, 269**:					
Wisflat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Arburua	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
270**, 271**, 272**:					
Wisflat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
270**, 271**, 272**:					
Arburua	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
273**:					
Wisflat	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
Oneil	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
274 Woo	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
275, 276 Woo	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey.
277, 278 Woo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
279 Woo	Severe: percs slowly.	Moderate: wetness.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
280 Woo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
281**:					
Woo	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey.
Anela	Moderate: percs slowly.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Urban land.					
282**:					
Woo loam	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Woo clay loam	Severe: percs slowly.	Moderate: wetness.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
Urban land.					
283, 284. Xerofluvents					
285 Yokut	Severe: percs slowly.	Moderate: seepage.	Slight	Slight	Poor: small stones.

See footnotes at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoons*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
286------------------ Yokut	Severe: percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Poor: small stones.

* If floodwater will not enter or damage sewage lagoons (low velocity or depth less than 5 feet), disregard flooding.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
101------------------ Agnal	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
102*:				
Akad-----------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Conosta--------------	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
103, 104-------------- Alros	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
105*:				
Altamont Variant-----	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Hytop----------------	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
106, 107, 108--------- Anela	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
109------------------ Apollo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
110------------------ Apollo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
111------------------ Apollo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
112------------------ Ararat	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
113*:				
Ararat---------------	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
113*:				
Gonzaga	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
114*:				
Ararat	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Peckham	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
115*:				
Ararat	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Peckham	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
116 Arbuckle Variant	Good	Probable	Probable	Poor: small stones, area reclaim.
117, 118 Arburua	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
119 Arburua	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
120 Arburua	Poor: area relcaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
121 Asolt	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
122 Asolt	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, area reclaim.
123, 124 Ayar	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
125 Ayar	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
126------------------ Ayar	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
127*:				
Ayar----------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Arburua-------------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
128*:				
Ayar----------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Arburua-------------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
129*:				
Ayar----------------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Arburua-------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
130*:				
Ayar----------------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Oneil---------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
131------------------ Ballvar	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
132*:				
Ballvar-------------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pedcat--------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
133, 134, 135--------- Bapos	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
136*:				
Bapos---------------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
136*:				
Arburua	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
137 Bisgani	Good	Probable	Improbable: too sandy.	Fair: too sandy, thin layer.
138 Bisgani	Good	Probable	Improbable: too sandy.	Fair: thin layer.
139, 140 Bolfar	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
141, 142 Britto	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
143 Britto	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness, excess sodium.
144 Capay	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
145 Capay	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
146, 147 Carranza	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
148*:				
Carranza	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Woo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
149 Chaqua	Fair: area reclaim, thin layer, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
150 Chateau	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
151 Chateau	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
152 Checker	Fair: low strength, thin layer, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
153 Chinvar	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
154 Cole Variant	Poor: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
155, 156 Conosta	Poor: area reclaim, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
157 Conosta	Poor: area reclaim, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
158*:				
Conosta	Poor: area reclaim, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Arburua	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
159, 160 Contra Costa	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
161, 162 Damluis	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
163, 164, 165 Damluis	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
166 Damluis Variant	Poor: cemented pan.	Probable	Probable	Poor: thin layer.
167 Deldota	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
168 Dosamigos	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
169 Dosamigos	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
170 Dospalos	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
171 Dospalos	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
172 Dospalos	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
173*:				
Dospalos	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
Bolfar	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
174*:				
Dospalos	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
175 Edminster	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
176*:				
Edminster	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Kesterson	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
177 Edminster Variant	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
178 Elnido	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
179 Elnido	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
180 Elnido	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
181 Escano	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
182 Fifield	Poor: area reclaim, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
183*:				
Fifield	Poor: area reclaim, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
Gonzaga	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
184*:				
Fifield	Poor: area reclaim, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
Honker	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Gonzaga	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
185*:				
Fifield	Poor: area reclaim, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
Millsholm	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
186. Fluvaquents				
187 Franciscan	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
188*:				
Franciscan	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Quinto	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Honker	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
189*:				
Franciscan	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
190*, 191*:				
Gonzaga	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
190*, 191*:				
Honker	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
192 Henmel	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
193 Herito	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
194, 195 Honker	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
196*:				
Honker	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Millsholm	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
197*:				
Honker	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Quinto	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
198 Kesterson	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
199, 200 Kesterson	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
201*:				
Kesterson	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
Edminster	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
202*, 203*:				
Laveaga	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
202*, 203*:				
Lecrag	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
204*:				
Laveaga, very stony	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Laveaga	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
205*:				
Laveaga	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Hytop	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
206, 207, 208 Los Banos	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
209*:				
Los Banos	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Pleito	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
210 Los Banos Variant	Good	Improbable: small stones.	Probable	Poor: area reclaim, small stones.
211 Marcuse	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
212 Marcuse	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
213 Millsholm	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
214, 215 Millsholm	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
216*:				
Millsholm------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Fifield--------------	Poor: area reclaim, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, slope.
217*:				
Millsholm------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Honker---------------	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Rock outcrop.				
218*:				
Millsholm------------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
219*:				
Millsholm------------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
220. Mollic Xerofluvents				
221------------------ Oneil	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope.
222------------------ Oneil	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
223------------------ Oneil	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
224------------------ Oquin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
225------------------ Oquin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
226------------------ Orognen	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
227*:				
Orognen	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Quiensabe	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
228 Palazzo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
229, 230 Paver	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
231, 232 Peckham	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones.
233*:				
Peckham	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Cole Variant	Poor: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
234, 235, 236 Pedcat	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
237 Pedcat	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
238*. Pits				
239 Pleito	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
240 Pleito	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
241*:				
Quinto	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Illito	Poor: area reclaim, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
241*:				
Rock outcrop.				
242*:				
Quinto	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Millsholm	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
243*:				
Quinto	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
244*:				
Rock outcrop.				
Ararat	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Illito	Poor: area reclaim, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
245*:				
Rock outcrop.				
Wisflat	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
246, 247 San Emigdio	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
248 Santanela	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
249 San Timoteo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
250*:				
San Timoteo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
250*:				
Wisflat	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
251*:				
San Timoteo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Wisflat	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
252*:				
Sehorn	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Contra Costa	Poor: area reclaim, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
253, 254 Stanislaus	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
255*:				
Stanislaus	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Dosamigos	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
256, 257 Triangle	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness, excess sodium.
258 Trulae	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
259*:				
Tunehill	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Quiensabe	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
260, 261 Turlock	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
262 Turmound	Fair: thin layer, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness, excess sodium.
263 Vernalis	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
264*:				
Vernalis	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pedcat	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, excess sodium.
265, 266 Volta	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium.
267 Wekoda	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
268*:				
Wisflat	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Arburua	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
269*:				
Wisflat	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Arburua	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
270*:				
Wisflat	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
Arburua	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
271*, 272*:				
Wisflat	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
Arburua	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
273*:				
Wisflat	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
Oneil	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
274 Woo	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
275 Woo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
276 Woo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
277, 278 Woo	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
279 Woo	Fair: low strength, thin layer, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
280 Woo	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
281*:				
Woo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
Anela	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
282*:				
Woo loam	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Woo clay loam	Fair: low strength, thin layer, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Urban land.				
283, 284. Xerofluvents				
285, 286 Yokut	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
101 Agnal	Slight	Severe: ponding, excess sodium, excess salt.	Ponding, percs slowly, excess salt.	Ponding, droughty.	Erodes easily, ponding, percs slowly.	Wetness, excess salt, excess sodium.
102*:						
Akad	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Conosta	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Percs slowly, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
103, 104 Alros	Slight	Severe: piping, excess sodium.	Deep to water**	Percs slowly, erodes easily, excess sodium.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
105*:						
Altamont Variant	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Hytop	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
106 Anela	Severe: seepage.	Slight	Deep to water	Droughty	Large stones	Droughty.
107 Anela	Severe: seepage.	Moderate: large stones.	Deep to water	Droughty, slope.	Large stones	Large stones, droughty.
108 Anela	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
109 Apollo	Moderate: depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
110, 111 Apollo	Severe: slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
112 Ararat	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
113*:						
Ararat	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
113*:						
Gonzaga----------	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
114*, 115*:						
Ararat-----------	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Peckham----------	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
116-------------- Arbuckle Variant	Severe: seepage.	Severe: seepage.	Deep to water	Droughty-------	Too sandy------	Droughty.
117-------------- Arburua	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
118, 119, 120----- Arburua	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
121, 122---------- Asolt	Severe: slope.	Severe: large stones.	Deep to water	Large stones, slow intake, percs slowly.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
123-------------- Ayar	Moderate: depth to rock, slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Percs slowly---	Percs slowly.
124, 125, 126----- Ayar	Severe: slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
127*, 128*, 129*:						
Ayar-------------	Severe: slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Arburua----------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
130*:						
Ayar-------------	Severe: slope.	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Oneil------------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
131-------------- Ballvar	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
132*:						
Ballvar	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
Pedcat	Slight	Severe: excess sodium, excess salt.	Percs slowly, excess salt, excess sodium.	Wetness, droughty.	Erodes easily, wetness, percs slowly.	Excess salt, excess sodium, erodes easily.
133 Bapos	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
134 Bapos	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
135 Bapos	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
136*:						
Bapos	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Arburua	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
137 Bisgani	Severe: seepage.	Severe: seepage, piping.	Deep to water**	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
138 Bisgani	Severe: seepage.	Severe: seepage, piping.	Deep to water**	Flooding	Too sandy	Favorable.
139 Bolfar	Slight	Moderate: piping.	Deep to water**	Favorable	Favorable	Favorable.
140 Bolfar	Slight	Moderate: piping.	Deep to water**	Excess salt	Favorable	Excess salt.
141, 142 Britto	Slight	Severe: excess sodium, excess salt.	Percs slowly, excess salt, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
143 Britto	Slight	Severe: ponding, excess sodium, excess salt.	Ponding, percs slowly, excess salt.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
144 Capay	Slight	Slight	Deep to water	Percs slowly	Percs slowly	Percs slowly.
145 Capay	Slight	Moderate: hard to pack.	Deep to water	Slow intake, percs slowly.	Percs slowly	Percs slowly.
146 Carranza	Moderate: seepage.	Moderate: piping, large stones.	Deep to water	Favorable	Large stones	Large stones.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
147---------------Carranza	Moderate: seepage, slope.	Moderate: piping, large stones.	Deep to water	Slope----------	Large stones---	Large stones.
148*:						
Carranza---------	Severe: seepage.	Moderate: thin layer, piping, large stones.	Deep to water	Favorable------	Large stones---	Large stones.
Woo--------------	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
149---------------Chaqua	Moderate: depth to rock, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
150---------------Chateau	Slight---------	Severe: excess sodium.	Deep to water**	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium, erodes easily.
151---------------Chateau	Slight---------	Severe: ponding, excess sodium.	Ponding, percs slowly, excess salt.	Ponding, droughty, excess sodium.	Erodes easily, ponding, percs slowly.	Wetness, excess salt, erodes easily.
152---------------Checker	Slight---------	Severe: piping, excess sodium, excess salt.	Deep to water**	Droughty, percs slowly, erodes easily.	Erodes easily	Excess salt, excess sodium, erodes easily.
153---------------Chinvar	Moderate: seepage.	Severe: piping.	Deep to water**	Excess salt----	Erodes easily	Erodes easily.
154---------------Cole Variant	Moderate: slope.	Moderate: piping.	Deep to water**	Percs slowly, slope.	Percs slowly---	Percs slowly.
155---------------Conosta	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Percs slowly, depth to rock, slope.	Large stones, depth to rock.	Large stones, depth to rock.
156, 157----------Conosta	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Percs slowly, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
158*:						
Conosta----------	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Percs slowly, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Arburua----------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
159, 160----------Contra Costa	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
161 Damluis	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
162 Damluis	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
163 Damluis	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
164 Damluis	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
165 Damluis	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
166 Damluis Variant	Moderate: cemented pan.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, cemented pan.	Cemented pan, percs slowly.	Cemented pan, percs slowly.
167 Deldota	Slight	Moderate: piping.	Deep to water**	Slow intake, percs slowly.	Percs slowly	Percs slowly.
168 Dosamigos	Slight	Moderate: hard to pack, excess salt.	Deep to water**	Percs slowly, excess salt.	Percs slowly	Percs slowly.
169 Dosamigos	Slight	Moderate: hard to pack, excess salt.	Deep to water**	Slow intake, percs slowly, excess salt.	Percs slowly	Percs slowly.
170 Dospalos	Slight	Moderate: hard to pack.	Deep to water**	Percs slowly	Percs slowly	Percs slowly.
171 Dospalos	Slight	Moderate: hard to pack.	Deep to water**	Slow intake, percs slowly.	Percs slowly	Percs slowly.
172 Dospalos	Slight	Moderate: hard to pack, excess salt.	Deep to water**	Droughty, slow intake, percs slowly.	Percs slowly	Excess salt, droughty, percs slowly.
173*:						
Dospalos	Slight	Moderate: hard to pack, excess salt.	Deep to water**	Droughty, slow intake, percs slowly.	Percs slowly	Excess salt, droughty, percs slowly.
Bolfar	Slight	Moderate: piping.	Deep to water**	Flooding, excess salt.	Favorable	Excess salt.
174*:						
Dospalos	Slight	Moderate: hard to pack.	Deep to water**	Slow intake, percs slowly.	Percs slowly	Percs slowly.
Urban land.						
175 Edminster	Moderate: seepage.	Severe: piping, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, excess sodium.	Erodes easily, wetness.	Wetness, excess sodium, erodes easily.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
176*:						
Edminster	Moderate: seepage.	Severe: piping, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, excess sodium.	Erodes easily, wetness.	Wetness, excess sodium, erodes easily.
Kesterson	Slight	Severe: piping, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
177 Edminster Variant	Severe: seepage.	Severe: piping.	Deep to water**	Droughty	Erodes easily	Erodes easily, droughty.
178 Elnido	Severe: seepage.	Severe: seepage, piping.	Deep to water**	Droughty	Erodes easily, too sandy.	Erodes easily, droughty.
179 Elnido	Severe: seepage.	Severe: piping.	Favorable	Wetness, droughty.	Erodes easily, wetness.	Erodes easily, droughty.
180 Elnido	Severe: seepage.	Severe: seepage, piping.	Deep to water**	Favorable	Erodes easily, too sandy.	Erodes easily.
181 Escano	Slight	Severe: piping.	Deep to water**	Favorable	Favorable	Favorable.
182 Fifield	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
183*:						
Fifield	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Gonzaga	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
184*:						
Fifield	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Honker	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Gonzaga	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
185*:						
Fifield	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Millsholm	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
186. Fluvaquents						
187---------------- Franciscan	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
188*:						
Franciscan--------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Quinto------------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Honker------------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
189*:						
Franciscan--------	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
190*, 191*:						
Gonzaga-----------	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Honker------------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
192---------------- Henmel	Moderate: seepage.	Moderate: thin layer, hard to pack.	Deep to water**	Percs slowly---	Percs slowly---	Percs slowly.
193---------------- Herito	Slight----------	Moderate: thin layer.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
194, 195----------- Honker	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
196*:						
Honker------------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Millsholm---------	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
197*:						
Honker------------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
197*:						
Quinto	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
198 Kesterson	Slight	Severe: piping, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
199, 200 Kesterson	Slight	Severe: piping, ponding, excess sodium.	Ponding, percs slowly, excess sodium.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
201*:						
Kesterson	Slight	Severe: piping, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
Edminster	Moderate: seepage.	Severe: piping, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, excess sodium.	Erodes easily, wetness.	Wetness, excess sodium, erodes easily.
202*, 203*:						
Laveaga	Severe: slope.	Severe: piping.	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Lecrag	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
204*:						
Laveaga, very stony	Severe: slope.	Severe: piping.	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Laveaga	Severe: slope.	Severe: piping.	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
205*:						
Laveaga	Severe: slope.	Severe: piping.	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Hytop	Severe: slope.	Severe: thin layer.	Deep to water	Droughty, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
206 Los Banos	Slight	Slight	Deep to water	Percs slowly	Percs slowly	Percs slowly.
207 Los Banos	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
208 Los Banos	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
209*:						
Los Banos	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
Pleito	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
210 Los Banos Variant	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Favorable	Droughty.
211 Marcuse	Slight	Severe: wetness, excess salt.	Percs slowly, excess salt.	Wetness, droughty, slow intake.	Wetness, percs slowly.	Wetness, excess salt.
212 Marcuse	Slight	Severe: excess sodium, excess salt.	Deep to water	Droughty, slow intake, percs slowly.	Percs slowly	Excess salt, excess sodium.
213, 214, 215 Millsholm	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
216*:						
Millsholm	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Fifield	Severe: slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
217*:						
Millsholm	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Honker	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Rock outcrop.						
218*, 219*:						
Millsholm	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
220. Mollic Xerofluvents						
221, 222, 223 Oneil	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
224 Oquin	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
225 Oquin	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
226 Orognen	Moderate: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily	Erodes easily, percs slowly.
227*:						
Orognen	Severe: slope.	Moderate: piping.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Quiensabe	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
228 Palazzo	Severe: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
229 Paver	Slight	Moderate: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
230 Paver	Moderate: slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
231 Peckham	Moderate: depth to rock, slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, percs slowly.	Large stones, depth to rock.	Large stones, droughty.
232 Peckham	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
233*:						
Peckham	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Cole Variant	Moderate: slope.	Moderate: piping.	Deep to water**	Percs slowly, slope.	Percs slowly	Percs slowly.
234, 235, 236 Pedcat	Slight	Severe: excess sodium, excess salt.	Percs slowly, excess salt, excess sodium.	Wetness, droughty.	Erodes easily, wetness, percs slowly.	Excess salt, excess sodium, erodes easily.
237 Pedcat	Slight	Severe: excess sodium, excess salt.	Percs slowly, excess salt, excess sodium.	Wetness, droughty, slow intake.	Wetness, percs slowly.	Excess salt, excess sodium.
238*. Pits						
239, 240 Pleito	Severe: slope.	Slight	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
241*:						
Quinto	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
241*:						
Illito	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
242*:						
Quinto	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Millsholm	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
243*:						
Quinto	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Rock outcrop.						
244*:						
Rock outcrop.						
Ararat	Severe: slope.	Severe: piping, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Illito	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Deep to water	Large stones, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
245*:						
Rock outcrop.						
Wisflat	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily.
246 San Emigdio	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
247 San Emigdio	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
248 Santanela	Slight	Severe: piping, ponding, excess sodium.	Ponding, percs slowly, excess sodium.	Ponding, excess sodium.	Erodes easily, ponding.	Wetness, excess sodium, erodes easily.
249 San Timoteo	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
250*, 251*:						
San Timoteo	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Wisflat	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily.
252*:						
Sehorn	Severe: slope.	Severe: thin layer.	Deep to water	Slow intake, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
Contra Costa	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
253 Stanislaus	Slight	Moderate: piping.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
254 Stanislaus	Slight	Moderate: hard to pack.	Deep to water**	Percs slowly	Percs slowly	Percs slowly.
255*:						
Stanislaus	Slight	Moderate: piping.	Deep to water	Percs slowly	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Dosamigos	Slight	Moderate: hard to pack, excess salt.	Deep to water**	Slow intake, percs slowly, excess salt.	Percs slowly	Percs slowly.
Urban land.						
256, 257 Triangle	Slight	Severe: ponding, excess sodium, excess salt.	Ponding, percs slowly, excess sodium.	Ponding, slow intake, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess salt, excess sodium.
258 Trulae	Slight	Moderate: hard to pack.	Deep to water**	Slow intake, percs slowly, excess salt.	Percs slowly	Excess salt, percs slowly.
259*:						
Tunehill	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Quiensabe	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
260, 261 Turlock	Slight	Severe: ponding, excess sodium, excess salt.	Ponding, percs slowly, excess sodium.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
262 Turmound	Slight	Severe: excess sodium.	Percs slowly, excess salt, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Excess salt, excess sodium, erodes easily.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
263--------------- Vernalis	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
264*:						
Vernalis---------	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Pedcat-----------	Slight---------	Severe: excess sodium, excess salt.	Percs slowly, excess salt, excess sodium.	Wetness, droughty.	Erodes easily, wetness, percs slowly.	Excess salt, excess sodium, erodes easily.
265--------------- Volta	Moderate: cemented pan.	Severe: excess sodium.	Percs slowly, excess sodium.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
266--------------- Volta	Moderate: cemented pan.	Severe: excess sodium.	Deep to water**	Percs slowly, erodes easily, excess sodium.	Erodes easily, percs slowly.	Erodes easily, excess sodium, percs slowly.
267--------------- Wekoda	Slight---------	Severe: excess sodium.	Percs slowly, excess sodium.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Excess sodium, percs slowly.
268*, 269*:						
Wisflat----------	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily.
Arburua----------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
270*, 271*, 272*:						
Wisflat----------	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily.
Rock outcrop.						
Arburua----------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
273*:						
Wisflat----------	Severe: depth to rock, slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily.
Rock outcrop.						
Oneil------------	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
274--------------- Woo	Slight---------	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
275--------------- Woo	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.

See footnotes at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
276 Woo	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
277 Woo	Slight	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
278 Woo	Moderate: slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
279 Woo	Slight	Severe: piping.	Deep to water	Percs slowly	Favorable	Favorable.
280 Woo	Slight	Severe: piping.	Deep to water	Slow intake, percs slowly.	Favorable	Percs slowly.
281*:						
Woo	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Anela	Severe: seepage.	Slight	Deep to water	Droughty	Large stones	Droughty.
Urban land.						
282*:						
Woo loam	Slight	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Woo clay loam	Slight	Severe: piping.	Deep to water**	Percs slowly	Favorable	Favorable.
Urban land.						
283, 284. Xerofluvents						
285, 286 Yokut	Slight	Moderate: large stones.	Deep to water	Droughty, erodes easily.	Large stones, erodes easily.	Large stones, erodes easily, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.
** If irrigated, consider other restrictive features.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
101------------- Agnal	0-2	Clay loam--------	CL	A-7	0	100	100	90-100	70-85	40-50	20-25
	2-31	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-60	20-35
	31-61	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-60	20-35
102*:											
Akad------------	0-3	Sandy clay loam	SM-SC, SC	A-4, A-6	0	80-100	75-95	65-80	35-50	25-35	5-15
	3-24	Very gravelly sandy clay loam, extremely gravelly sandy clay loam.	GP-GC, GC	A-2	0-5	20-60	15-50	10-45	5-25	30-40	10-20
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Conosta---------	0-14	Clay loam--------	CL	A-6	0-10	80-100	75-95	65-90	55-75	30-40	10-20
	14-27	Cobbly clay loam, gravelly clay, gravelly clay loam.	GC, CL, CH	A-7	5-30	65-80	60-75	55-70	45-60	40-55	15-30
	27-32	Very cobbly clay loam, very gravelly clay loam, very gravelly clay.	GC	A-2, A-7	10-40	50-65	45-60	40-55	30-50	40-55	15-30
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
103------------- Alros	0-12	Clay loam--------	CL	A-6	0	100	100	90-100	70-80	30-40	10-15
	12-39	Loam, clay loam, sandy clay loam.	ML, SM	A-4	0	95-100	85-100	75-100	35-75	30-40	5-10
	39-60	Stratified sandy loam to clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	100	100	50-80	40-60	25-40	5-15
104------------- Alros	0-17	Clay loam--------	CL	A-6	0	100	100	90-100	70-80	30-40	10-15
	17-22	Loam, clay loam, sandy clay loam.	ML, SM	A-4	0	95-100	85-100	75-100	35-75	30-40	5-10
	22-60	Stratified sandy loam to clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	100	100	50-80	40-60	25-40	5-15
105*:											
Altamont Variant	0-21	Clay-------------	CH	A-7	0	95-100	90-100	80-100	70-95	50-60	25-35
	21-42	Clay, clay loam	CL, CH	A-7	0	95-100	90-100	80-100	65-90	40-60	20-35
	42-47	Weathered bedrock	---	---	---	---	---	---	---	---	---
	47	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hytop-----------	0-5	Sandy loam-------	SM-SC	A-4	0-5	95-100	90-100	50-70	35-50	20-30	5-10
	5-10	Sandy clay loam	SM-SC, SC	A-4, A-6	0-5	95-100	90-100	70-90	35-50	25-35	5-15
	10-26	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	60-90	40-55	20-30
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
106-------------- Anela	0-16	Gravelly loam----	GM-GC, GC	A-4, A-6	0-10	55-80	50-75	45-70	35-50	25-35	5-15
	16-42	Very gravelly clay loam, extremely gravelly clay loam.	GC	A-2	0-15	30-45	25-40	20-35	15-30	30-40	10-20
	42-60	Stratified very gravelly clay loam to extremely gravelly loamy coarse sand.	GC	A-2	10-20	20-35	15-30	10-25	5-20	30-35	10-15
107-------------- Anela	0-12	Very gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-35	10-20	20-30	NP-10
	12-42	Very gravelly sandy loam, very gravelly loam, extremely gravelly sandy loam.	GM-GC, GC	A-2	10-20	25-45	20-40	15-35	10-20	25-35	5-15
	42-60	Stratified very gravelly clay loam to extremely gravelly loamy coarse sand.	GC	A-2	10-20	20-35	15-30	10-25	5-20	30-35	10-15
108-------------- Anela	0-23	Very gravelly sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	15-35	10-20	20-30	NP-10
	23-32	Very gravelly sandy loam, very gravelly loam, extremely gravelly sandy loam.	GM-GC, GC	A-2	10-20	25-45	20-40	15-35	10-20	25-35	5-15
	32-60	Stratified very gravelly clay loam to extremely gravelly loamy coarse sand.	GC	A-2	10-20	20-35	15-30	10-25	5-20	30-35	10-15
109, 110, 111---- Apollo	0-10	Clay loam--------	ML, CL	A-6, A-7	0	100	100	90-100	70-80	35-45	10-20
	10-41	Clay loam, silty clay loam.	ML, CL	A-6, A-7	0	100	100	90-100	70-80	35-45	10-20
	41	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
112--------------- Ararat	0-7	Extremely stony loam.	CL-ML, ML	A-4	25-45	95-100	90-100	75-95	55-75	25-35	5-10
	7-24	Very stony loam, very bouldery loam, very stony sandy clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	50-70	95-100	90-100	70-90	40-65	25-35	5-15
	24-45	Extremely stony sandy clay loam, extremely bouldery sandy clay loam, extremely stony loam.	SC, SM-SC, CL-ML, CL	A-4, A-6, A-2	75-85	95-100	90-100	70-90	30-55	25-35	5-15
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
113*:											
Ararat-----------	0-7	Extremely stony loam.	CL-ML, ML	A-4	25-45	95-100	90-100	75-95	55-75	25-35	5-10
	7-24	Very stony loam, very bouldery loam, very stony sandy clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	50-70	95-100	90-100	70-90	40-65	25-35	5-15
	24-45	Extremely stony sandy clay loam, extremely bouldery sandy clay loam, extremely stony loam.	SC, SM-SC, CL-ML, CL	A-4, A-6, A-2	75-85	95-100	90-100	70-90	30-55	25-35	5-15
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gonzaga----------	0-16	Loam-------------	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	65-95	50-65	25-35	5-15
	16-22	Gravelly loam, gravelly sandy clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	0-10	60-80	55-75	50-70	35-50	25-35	5-15
	22-39	Gravelly clay loam, gravelly clay, gravelly sandy clay.	CL, CH, SC, GC	A-7	0-5	60-80	55-75	50-70	35-60	40-60	20-35
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114*, 115*:											
Ararat-----------	0-7	Extremely stony loam.	CL-ML, ML	A-4	25-45	95-100	90-100	75-95	55-75	25-35	5-10
	7-24	Very stony loam, very bouldery loam, very stony sandy clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	50-70	95-100	90-100	70-90	40-65	25-35	5-15
	24-45	Extremely stony sandy clay loam, extremely bouldery sandy clay loam, extremely stony loam.	SC, SM-SC, CL-ML, CL	A-4, A-6, A-2	75-85	95-100	90-100	70-90	30-55	25-35	5-15
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
114*, 115*:											
Peckham	0-13	Cobbly loam	CL-ML, ML	A-4	25-50	95-100	90-100	75-95	50-65	25-35	5-10
	13-20	Very cobbly loam, very cobbly sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	55-75	95-100	90-100	75-95	35-65	25-35	5-15
	20-24	Extremely cobbly clay.	CH, GC	A-7	65-80	70-80	45-70	35-70	35-65	40-65	20-40
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
116 Arbuckle Variant	0-19	Sandy loam	SM, SM-SC	A-2	0-5	80-100	75-90	45-65	20-35	20-30	NP-10
	19-37	Gravelly sandy clay loam, gravelly loam.	GM-GC, GC	A-2, A-4, A-6	0-5	55-70	50-60	40-55	25-40	25-35	5-15
	37-60	Very gravelly loamy coarse sand.	GM, GP-GM	A-1	0-5	45-55	35-50	15-30	5-15	---	NP
117, 118, 119, 120 Arburua	0-10	Loam	ML, CL-ML	A-4	0	95-100	85-100	80-95	65-75	25-35	5-10
	10-32	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	75-100	70-100	50-75	25-45	5-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
121, 122 Asolt	0-3	Very stony clay	CL, CH	A-7	25-45	95-100	90-100	85-95	70-90	40-60	20-35
	3-42	Cobbly clay, stony clay.	CL, CH	A-7	25-45	95-100	90-100	85-95	70-90	40-60	20-35
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
123, 124, 125, 126 Ayar	0-15	Clay	CH	A-7	0	100	95-100	90-100	85-100	50-60	25-35
	15-47	Clay, silty clay, clay loam.	CH, CL	A-7	0	100	95-100	90-100	75-100	40-70	20-40
	47	Weathered bedrock	---	---	---	---	---	---	---	---	---
127*, 128*, 129*:											
Ayar	0-15	Clay	CH	A-7	0	100	95-100	90-100	85-100	50-60	25-35
	15-47	Clay, silty clay, clay loam.	CH, CL	A-7	0	100	95-100	90-100	75-100	40-70	20-40
	47	Weathered bedrock	---	---	---	---	---	---	---	---	---
Arburua	0-10	Loam	ML, CL-ML	A-4	0	95-100	85-100	80-95	65-75	25-35	5-10
	10-32	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	75-100	70-100	50-75	25-45	5-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
130*:											
Ayar	0-15	Clay	CH	A-7	0	100	95-100	90-100	85-100	50-60	25-35
	15-47	Clay, silty clay, clay loam.	CH, CL	A-7	0	100	95-100	90-100	75-100	40-70	20-40
	47	Weathered bedrock	---	---	---	---	---	---	---	---	---
Oneil	0-21	Silt loam	ML	A-4	0	95-100	90-100	85-100	75-90	30-40	5-10
	21-29	Silt loam, silty clay loam.	ML	A-4, A-6, A-7	0	90-95	90-95	90-95	80-90	30-45	5-15
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
131----------------- Ballvar	0-15	Loam----------------	ML, CL-ML	A-4	0	100	95-100	80-95	50-60	25-35	5-10
	15-45	Loam, sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	100	95-100	80-95	35-60	25-35	5-15
	45-62	Loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	50-60	25-35	5-15
132*:											
Ballvar----------	0-15	Loam----------------	ML, CL-ML	A-4	0	100	95-100	80-95	50-60	25-35	5-10
	15-45	Loam, sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	100	95-100	80-95	35-60	25-35	5-15
	45-62	Loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	50-60	25-35	5-15
Pedcat-----------	0-4	Loam----------------	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	4-22	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	45-55	20-30
	22-60	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	80-100	70-95	35-50	15-25
133----------------- Bapos	0-12	Sandy clay loam	SC	A-6	0	80-100	75-100	60-90	35-50	30-35	10-15
	12-24	Clay loam, clay	CL, CH	A-7	0	85-100	75-100	70-95	65-85	40-60	15-30
	24-60	Stratified very gravelly sandy clay loam to gravelly clay loam.	CL, GC, SC	A-2, A-6, A-7	0	40-80	30-75	25-65	20-55	30-45	10-20
134, 135---------- Bapos	0-12	Clay loam----------	CL	A-6	0	85-100	75-100	70-95	60-80	30-40	10-15
	12-45	Clay loam, clay	CL, CH	A-7	0	85-100	75-100	70-95	65-85	40-60	15-30
	45-60	Stratified very gravelly sandy clay loam to gravelly clay loam.	CL, GC, SC	A-2, A-6, A-7	0	40-80	30-75	25-65	20-55	30-45	10-20
136*:											
Bapos------------	0-12	Clay loam----------	CL	A-6	0	85-100	75-100	70-95	60-80	30-40	10-15
	12-45	Clay loam, clay	CL, CH	A-7	0	85-100	75-100	70-95	65-85	40-60	15-30
	45-60	Stratified very gravelly sandy clay loam to gravelly clay loam.	CL, GC, SC	A-2, A-6, A-7	0	40-80	30-75	25-65	20-55	30-45	10-20
Arburua----------	0-10	Loam----------------	ML, CL-ML	A-4	0	95-100	85-100	80-95	65-75	25-35	5-10
	10-32	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	75-100	70-100	50-75	25-45	5-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
137----------------- Bisgani	0-20	Loamy sand---------	SM	A-1, A-2	0	100	95-100	45-70	15-25	---	NP
	20-60	Coarse sand, loamy sand.	SM, SP-SM	A-1, A-2, A-3	0	100	95-100	45-70	5-25	---	NP
138----------------- Bisgani	0-9	Clay loam----------	CL	A-6	0	100	95-100	80-100	70-85	30-40	10-15
	9-15	Sandy loam---------	SM	A-2	0	100	95-100	50-70	25-35	---	NP
	15-60	Coarse sand, loamy sand.	SM, SP-SM	A-1, A-2, A-3	0	100	95-100	45-70	5-25	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
139----------- Bolfar	0-25	Clay loam--------	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	25-41	Loam, clay loam, sandy clay loam.	CL, SC	A-6	0	100	100	80-100	35-80	30-40	10-20
	41-60	Loam, clay loam	CL	A-6	0	100	100	80-100	50-75	30-40	10-20
140----------- Bolfar	0-26	Clay loam--------	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	26-60	Stratified sandy loam to clay loam.	CL	A-6	0	100	100	80-100	50-75	30-40	10-20
141, 142, 143---- Britto	0-5	Clay loam--------	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	5-22	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	45-60	20-30
	22-62	Sandy clay loam, clay loam, clay.	CL	A-7	0	100	100	85-100	50-95	40-50	15-25
144----------- Capay	0-15	Clay loam--------	CL	A-7	0	100	100	95-100	70-80	40-50	15-25
	15-36	Clay-------------	CL, CH	A-7	0	100	100	95-100	75-95	40-60	20-35
	36-60	Clay loam--------	CL	A-7	0	100	100	95-100	70-85	40-50	15-25
145----------- Capay	0-22	Clay-------------	CH, CL	A-7	0	100	100	95-100	85-95	40-60	20-35
	22-60	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	40-60	20-35
146----------- Carranza	0-21	Gravelly loam----	GM-GC, GM, SM-SC, SM	A-4	0-5	65-80	60-75	50-70	35-50	25-35	5-10
	21-55	Clay loam, gravelly sandy clay loam, gravelly clay loam.	GC, CL	A-6	5-20	60-90	55-85	45-80	35-65	30-40	10-20
	55-60	Extremely gravelly sandy clay loam, extremely gravelly clay loam, extremely gravelly loam.	GP-GC, GM-GC, GC	A-2	10-30	20-30	15-25	10-20	5-20	25-40	5-15
147----------- Carranza	0-12	Gravelly clay loam.	GC, CL	A-6	0-5	65-80	60-75	55-70	40-55	30-40	10-15
	12-38	Clay loam, gravelly sandy clay loam, gravelly clay loam.	GC, CL	A-6	5-20	60-90	55-85	45-80	35-65	30-40	10-20
	38-60	Extremely gravelly sandy clay loam, extremely gravelly clay loam.	GP-GC, GM-GC, GC	A-2	10-30	20-30	15-25	10-20	5-20	25-40	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
148*:											
Carranza--------	0-22	Gravelly clay loam.	GC, CL	A-6	0-5	65-90	60-75	50-70	40-55	30-40	10-15
	22-38	Gravelly sandy clay loam, gravelly clay loam.	GC, CL	A-6	5-20	60-90	55-75	50-70	35-55	30-40	10-20
	38-60	Stratified extremely gravelly loamy sand to extremely gravelly sandy loam.	GP-GM, GM	A-1	5-15	15-30	10-25	10-20	5-14	15-20	NP-5
Woo-------------	0-19	Clay loam--------	CL	A-6	0	100	95-100	90-100	70-80	30-40	10-20
	19-38	Loam, clay loam	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	50-75	25-40	5-20
	38-62	Stratified gravelly sandy loam to gravelly loamy sand.	SM	A-1, A-2	0	60-80	55-75	30-50	15-35	20-30	NP-5
149-------------- Chaqua	0-19	Loam-------------	CL-ML, ML	A-4	0	100	95-100	85-95	55-75	25-35	5-10
	19-47	Loam, clay loam, sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0-5	85-100	80-100	70-95	40-75	25-40	5-15
	47	Weathered bedrock	---	---	---	---	---	---	---	---	---
150, 151--------- Chateau	0-15	Clay-------------	CH	A-7	0	100	100	90-100	80-95	50-65	25-35
	15-23	Clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	90-100	80-95	40-65	15-35
	23-62	Silty clay, clay	CH	A-7	0	100	100	90-100	80-95	50-65	25-35
152-------------- Checker	0-15	Loam-------------	CL-ML, ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	15-55	Loam, clay loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-80	25-40	5-15
	55-61	Clay loam, silty clay.	CL, CH	A-7	0	100	100	90-100	75-95	40-60	15-30
153-------------- Chinvar	0-13	Loam-------------	CL-ML, ML	A-4	0	100	95-100	80-95	50-75	25-35	5-10
	13-38	Loam, clay loam	CL-ML, CL	A-4, A-6	0	100	95-100	80-95	50-75	25-40	5-15
	38-60	Stratified gravelly sandy loam to very gravelly loam.	GM, GM-GC, SM, SM-SC	A-1, A-2	0-5	40-70	35-65	25-60	15-35	20-30	NP-10
154-------------- Cole Variant	0-6	Clay loam--------	CL	A-6	0-5	90-100	85-100	75-95	60-80	30-40	10-20
	6-32	Clay, clay loam	CL, CH	A-7	0-5	90-100	85-100	75-95	60-80	40-55	20-30
	32-64	Stratified loam to clay.	CL	A-6	0-5	90-100	85-100	70-90	55-80	25-40	10-20
155, 156, 157---- Conosta	0-14	Clay loam--------	CL	A-6	0-10	80-100	75-95	65-90	55-75	30-40	10-20
	14-27	Cobbly clay loam, gravelly clay, gravelly clay loam.	GC, CL, CH	A-7	5-30	65-80	60-75	55-70	45-60	40-55	15-30
	27-32	Very cobbly clay loam, very gravelly clay loam, very gravelly clay.	GC	A-2, A-7	10-40	50-65	45-60	40-55	30-50	40-55	15-30
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
158*:											
Conosta----------	0-14	Clay loam--------	CL	A-6	0-10	80-100	75-95	65-90	55-75	30-40	10-20
	14-27	Cobbly clay loam, gravelly clay, gravelly clay loam.	GC, CL, CH	A-7	5-30	65-80	60-75	55-70	45-60	40-55	15-30
	27-32	Very cobbly clay loam, very gravelly clay loam, very gravelly clay.	GC	A-2, A-7	10-40	50-65	45-60	40-55	30-50	40-55	15-30
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
Arburua----------	0-10	Loam-------------	ML, CL-ML	A-4	0	95-100	85-100	80-95	65-75	25-35	5-10
	10-32	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	75-100	70-100	50-75	25-45	5-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
159, 160--------- Contra Costa	0-19	Loam-------------	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-90	50-70	25-35	5-15
	19-39	Clay, clay loam	CL, CH	A-7	0	90-100	85-100	80-100	75-95	40-55	20-30
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
161, 162--------- Damluis	0-22	Clay loam--------	CL	A-7	0-5	95-100	90-100	80-95	65-80	40-50	15-25
	22-44	Clay, sandy clay	CH	A-7	0-5	95-100	90-100	80-95	50-85	50-60	25-35
	44-52	Clay loam, sandy clay loam, sandy clay.	SC, CL	A-6, A-7	0-5	95-100	90-100	75-95	35-75	30-45	10-20
	52-60	Very gravelly sandy loam, very gravelly sandy clay loam.	GC, GM-GC	A-2	5-10	30-55	25-50	15-40	10-25	25-35	5-15
163-------------- Damluis	0-21	Gravelly clay loam.	CL, GC	A-7	5-10	55-80	50-75	45-70	35-60	40-50	15-25
	21-46	Gravelly clay, gravelly sandy clay.	CH, GC	A-7	5-10	55-80	50-75	45-75	35-60	50-60	25-35
	46-60	Gravelly clay loam, gravelly sandy clay loam, gravelly sandy clay.	SC, GC	A-6, A-7, A-2	5-10	55-80	50-75	45-70	25-50	30-45	10-20
164, 165--------- Damluis	0-22	Gravelly clay loam.	CL, GC	A-7	5-10	55-80	50-75	45-70	35-60	40-50	15-25
	22-44	Gravelly clay, gravelly sandy clay.	CH, GC	A-7	5-10	55-80	50-75	45-75	35-60	50-60	25-35
	44-52	Gravelly clay loam, gravelly sandy clay loam, gravelly sandy clay.	SC, GC	A-6, A-7, A-2	5-10	55-80	50-75	45-70	25-50	30-45	10-20
	52-60	Very gravelly sandy loam, very gravelly sandy clay loam.	GC, GM-GC	A-2	5-10	30-65	25-60	15-45	10-30	25-35	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
166--------------- Damluis Variant	0-6	Clay loam---------	CL	A-6, A-7	0	80-100	75-100	70-95	60-80	30-45	10-20
	6-32	Clay--------------	CL, CH	A-7	0	80-100	75-100	70-100	60-95	45-60	25-35
	32-60	Indurated---------	---	---	---	---	---	---	---	---	---
	60-73	Very gravelly coarse sand.	GP	A-1	0	40-55	35-50	15-25	0-5	---	NP
167--------------- Deldota	0-17	Clay--------------	CL, CH	A-7	0	100	95-100	90-100	75-95	45-60	20-30
	17-24	Clay loam, clay	CL, CH	A-7	0	100	95-100	90-100	70-95	45-60	20-30
	24-68	Clay loam---------	ML, CL	A-6, A-7	0	100	95-100	90-100	70-80	35-45	10-20
168--------------- Dosamigos	0-5	Clay loam---------	CL	A-6, A-7	0	100	100	90-100	70-80	35-45	15-20
	5-29	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-55	15-30
	29-62	Clay loam, clay, sandy clay.	CL, CH	A-7, A-6	0	100	95-100	85-100	50-95	35-55	15-30
169--------------- Dosamigos	0-15	Clay--------------	CL	A-7	0	100	100	90-100	75-95	40-50	20-30
	15-27	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-55	15-30
	27-60	Clay loam, clay, sandy clay.	CL, CH	A-7, A-6	0	100	95-100	85-100	50-95	35-55	15-30
170--------------- Dospalos	0-27	Clay loam---------	CL	A-7	0	100	100	90-100	70-95	40-50	15-25
	27-37	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-65	15-35
	37-62	Clay loam, sandy clay loam, clay.	CL, CH	A-6, A-7	0	100	100	80-100	50-85	35-60	15-30
171--------------- Dospalos	0-24	Clay--------------	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	24-35	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-65	15-35
	35-62	Clay loam, sandy clay loam, clay.	CL, CH	A-6, A-7	0	100	100	80-100	50-85	35-60	15-30
172--------------- Dospalos	0-32	Clay--------------	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	32-41	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-65	15-35
	41-62	Clay loam, sandy clay loam, clay.	CL, CH	A-6, A-7	0	100	100	80-100	50-85	35-60	15-30
173*:											
Dospalos---------	0-32	Clay--------------	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	32-41	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-65	15-35
	41-62	Clay loam, sandy clay loam, clay.	CL, CH	A-6, A-7	0	100	100	80-100	50-85	35-60	15-30
Bolfar-----------	0-26	Clay loam---------	CL	A-6	0	100	100	90-100	75-80	30-40	10-20
	26-60	Stratified sandy loam to clay loam.	CL	A-6	0	100	100	80-100	50-75	30-40	10-20
174*:											
Dospalos---------	0-24	Clay--------------	CH	A-7	0	100	100	90-100	75-95	50-65	25-35
	24-35	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-65	15-35
	35-62	Clay loam, sandy clay loam, clay.	CL, CH	A-6, A-7	0	100	100	80-100	50-85	35-60	15-30
Urban land.											
175--------------- Edminster	0-4	Loam--------------	ML	A-4	0	100	100	70-90	50-60	25-35	NP-10
	4-26	Clay loam, loam	CL	A-6	0	100	100	80-100	60-85	30-40	10-15
	26-60	Stratified sandy loam to clay loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	50-90	40-60	25-35	5-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
176*:											
Edminster	0-4	Loam	ML	A-4	0	100	100	70-90	50-60	25-35	NP-10
	4-26	Clay loam, loam	CL	A-6	0	100	100	80-100	60-85	30-40	10-15
	26-60	Stratified sandy loam to clay loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	50-90	40-60	25-35	5-10
Kesterson	0-3	Sandy loam	SM	A-4	0	100	100	50-75	35-50	20-30	NP-5
	3-26	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-70	30-40	10-15
	26-46	Loam, sandy clay loam, clay loam.	SM, ML	A-4	0	100	100	60-100	40-70	30-40	5-10
	46-60	Stratified fine sandy loam to clay loam.	CL-ML, ML	A-4	0	100	95-100	50-90	50-70	25-35	5-10
177 Edminster Variant	0-16	Sand	SP-SM, SM	A-1, A-3, A-2	0	100	100	40-70	5-15	---	NP
	16-25	Sand, loamy sand	SP-SM, SM	A-1, A-3, A-2	0	100	100	40-70	5-20	---	NP
	25-60	Stratified sandy loam to silt loam.	ML	A-4	0	100	100	75-90	50-75	25-40	NP-10
178 Elnido	0-18	Sandy loam	SM	A-4	0	100	100	60-70	35-50	20-30	NP-5
	18-60	Sandy loam, loam, silt loam.	SM, ML	A-4	0	100	100	60-95	35-65	20-30	NP-5
179 Elnido	0-8	Sandy loam	SM	A-4	0	100	100	60-70	35-50	20-30	NP-5
	8-32	Sandy loam, loam, silt loam.	SM, ML	A-4	0	100	100	60-95	35-65	20-30	NP-5
	32-60	Loamy sand	SM	A-2, A-1	0	100	100	40-60	20-35	---	NP
180 Elnido	0-17	Clay loam	CL	A-6	0	100	100	90-100	70-80	30-40	10-15
	17-44	Sandy loam, loam, silt loam.	SM, ML	A-4	0	100	100	60-95	35-65	20-30	NP-5
	44-60	Stratified sand to silt loam.	SM	A-2, A-4	0	100	100	50-85	15-50	20-30	NP-5
181 Escano	0-17	Clay loam	CL	A-6	0	100	100	90-100	70-80	30-40	10-15
	17-29	Clay loam, silt loam, loam.	CL	A-6	0	100	100	85-100	60-80	30-40	10-20
	29-51	Clay loam	ML	A-4	0	100	100	90-100	70-80	30-40	5-10
	51-60	Stratified loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-100	60-80	25-40	5-20
182 Fifield	0-5	Sandy loam	SM	A-4	0-5	80-100	75-95	50-70	35-50	20-30	NP-5
	5-15	Very gravelly loam, very gravelly sandy clay loam.	GM-GC, GM	A-2, A-4	0-10	35-55	30-50	25-45	20-40	25-35	5-10
	15-30	Extremely gravelly loam, extremely gravelly sandy loam.	GM-GC, GM	A-2	5-20	20-35	15-30	10-25	5-20	25-35	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
183*:											
Fifield---------	0-5	Sandy loam-------	SM	A-4	0-5	80-100	75-95	50-70	35-50	20-30	NP-5
	5-15	Very gravelly loam, very gravelly sandy clay loam.	GM-GC, GM	A-2, A-4	0-10	35-55	30-50	25-45	20-40	25-35	5-10
	15-30	Extremely gravelly loam, extremely gravelly sandy loam.	GM-GC, GM	A-2	5-20	20-35	15-30	10-25	5-20	25-35	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gonzaga---------	0-16	Loam-------------	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	65-95	50-65	25-35	5-15
	16-22	Gravelly loam, gravelly sandy clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	0-10	60-80	55-75	50-70	35-50	25-35	5-15
	22-39	Gravelly clay loam, gravelly clay, gravelly sandy clay.	CL, CH, SC, GC	A-7	0-5	60-80	55-75	50-70	35-60	40-60	20-35
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
184*:											
Fifield---------	0-5	Sandy loam-------	SM	A-4	0-5	80-100	75-95	50-70	35-50	20-30	NP-5
	5-15	Very gravelly loam, very gravelly sandy clay loam.	GM-GC, GM	A-2, A-4	0-10	35-55	30-50	25-45	20-40	25-35	5-10
	15-30	Extremely gravelly loam, extremely gravelly sandy loam.	GM-GC, GM	A-2	5-20	20-35	15-30	10-25	5-20	25-35	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Honker----------	0-7	Sandy loam-------	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gonzaga---------	0-16	Loam-------------	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	65-95	50-65	25-35	5-15
	16-22	Gravelly loam, gravelly sandy clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	0-10	60-80	55-75	50-70	35-50	25-35	5-15
	22-39	Gravelly clay loam, gravelly clay, gravelly sandy clay.	CL, CH, SC, GC	A-7	0-5	60-80	55-75	50-70	35-60	40-60	20-35
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
185*:											
Fifield---------	0-5	Sandy loam-------	SM	A-4	0-5	80-100	75-95	50-70	35-50	20-30	NP-5
	5-15	Very gravelly loam, very gravelly sandy clay loam.	GM-GC, GM	A-2, A-4	0-10	35-55	30-50	25-45	20-40	25-35	5-10
	15-30	Extremely gravelly loam, extremely gravelly sandy loam.	GM-GC, GM	A-2	5-20	20-35	15-30	10-25	5-20	25-35	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Millsholm-------	0-19	Loam-------------	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
186. Fluvaquents											
187-------------- Franciscan	0-10	Sandy loam-------	SM-SC	A-4	0	90-100	85-100	50-65	35-50	20-30	5-10
	10-26	Sandy clay loam, clay loam.	CL, SC	A-6	0-5	80-90	75-90	70-85	35-60	30-40	10-20
	26-38	Gravelly sandy clay loam, gravelly clay loam.	SC, GC	A-2, A-6	0-5	55-80	50-75	45-70	25-50	30-40	10-20
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
188*:											
Franciscan------	0-10	Sandy loam-------	SM-SC	A-4	0	90-100	85-100	50-65	35-50	20-30	5-10
	10-26	Sandy clay loam, clay loam.	CL, SC	A-6	0-5	80-90	75-90	70-85	35-60	30-40	10-20
	26-38	Gravelly sandy clay loam, gravelly clay loam.	SC, GC	A-2, A-6	0-5	55-80	50-75	45-70	25-50	30-40	10-20
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Quinto----------	0-6	Gravelly sandy loam.	SM-SC, GM-GC	A-2	0-5	55-80	50-75	35-50	25-35	20-30	5-10
	6-17	Gravelly sandy clay loam.	GC, SC	A-2, A-6	0-10	55-80	50-75	45-65	25-50	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Honker----------	0-7	Sandy loam-------	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
189*:											
Franciscan	0-10	Sandy loam	SM-SC	A-4	0	90-100	85-100	50-65	35-50	20-30	5-10
	10-26	Sandy clay loam, clay loam.	CL, SC	A-6	0-5	80-90	75-90	70-85	35-60	30-40	10-20
	26-38	Gravelly sandy clay loam, gravelly clay loam.	SC, GC	A-2, A-6	0-5	55-80	50-75	45-70	25-50	30-40	10-20
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
190*, 191*:											
Gonzaga	0-16	Loam	CL-ML, CL	A-4, A-6	0-5	80-100	75-100	65-95	50-65	25-35	5-15
	16-22	Gravelly loam, gravelly sandy clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	0-10	60-80	55-75	50-70	35-50	25-35	5-15
	22-39	Gravelly clay loam, gravelly clay, gravelly sandy clay.	CL, CH, SC, GC	A-7	0-5	60-80	55-75	50-70	35-60	40-60	20-35
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Honker	0-7	Sandy loam	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
192 Henmel	0-15	Clay loam	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
	15-37	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	100	90-100	50-95	40-55	20-30
	37-44	Sandy clay	CL	A-7	0	100	100	85-95	50-60	40-50	15-25
	44-66	Sandy loam, sandy clay loam.	SM-SC, SC	A-4, A-6	0	100	100	60-85	35-50	20-35	5-15
193 Herito	0-12	Loam	CL-ML, ML	A-4	0-5	90-100	85-100	70-90	50-60	25-35	5-10
	12-43	Clay loam, sandy clay.	CL, SC	A-7	0-5	90-100	85-100	70-95	40-65	40-50	20-25
	43-60	Clay loam, sandy clay loam.	SC, CL	A-6, A-7	0-5	90-100	85-100	70-90	40-75	35-45	15-25
194, 195 Honker	0-7	Sandy loam	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
196*:											
Honker----------	0-7	Sandy loam-------	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Millsholm-------	0-19	Loam------------	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
197*:											
Honker----------	0-7	Sandy loam-------	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Quinto----------	0-6	Gravelly sandy loam.	SM-SC, GM-GC	A-2	0-5	55-80	50-75	35-50	25-35	20-30	5-10
	6-17	Gravelly sandy clay loam.	GC, SC	A-2, A-6	0-10	55-80	50-75	45-65	25-50	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
198------------- Kesterson	0-3	Sandy loam-------	SM	A-4	0	100	100	50-75	35-50	20-30	NP-5
	3-26	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-70	30-40	10-15
	26-46	Loam, sandy clay loam, clay loam.	SM, ML	A-4	0	100	100	60-100	40-70	30-40	5-10
	46-60	Stratified fine sandy loam to clay loam.	CL-ML, ML	A-4	0	100	95-100	50-90	50-70	25-35	5-10
199------------- Kesterson	0-6	Sandy loam-------	SM	A-4	0	100	100	50-75	35-50	20-30	NP-5
	6-43	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-70	30-40	10-15
	43-60	Stratified fine sandy loam to clay loam.	CL-ML, ML	A-4	0	100	95-100	50-90	50-70	25-35	5-10
200------------- Kesterson	0-6	Loam------------	ML	A-4	0	100	100	65-80	50-60	25-35	NP-10
	6-43	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-70	30-40	10-15
	43-60	Stratified fine sandy loam to clay loam.	CL-ML, ML	A-4	0	100	95-100	50-90	50-70	25-35	5-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
201*:											
Kesterson-------	0-3	Sandy loam-------	SM	A-4	0	100	100	50-75	35-50	20-30	NP-5
	3-26	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	40-70	30-40	10-15
	26-46	Loam, sandy clay loam, clay loam.	SM, ML	A-4	0	100	100	60-100	40-70	30-40	5-10
	46-60	Stratified fine sandy loam to clay loam.	CL-ML, ML	A-4	0	100	95-100	50-90	50-70	25-35	5-10
Edminster-------	0-4	Loam-------------	ML	A-4	0	100	100	70-90	50-60	25-35	NP-10
	4-26	Clay loam, loam	CL	A-6	0	100	100	80-100	60-85	30-40	10-15
	26-60	Stratified sandy loam to clay loam.	SM, SM-SC, ML, CL-ML	A-4	0	100	100	50-90	40-60	25-35	5-10
202*, 203*:											
Laveaga---------	0-18	Sandy clay loam	SC	A-6	0	100	95-100	75-90	35-50	30-40	10-20
	18-27	Sandy clay, clay, clay loam.	CL, CH	A-7	0-5	100	95-100	80-95	50-85	40-55	20-30
	27-48	Sandy loam, sandy clay loam, loam.	SC, SM-SC, CL-ML, CL	A-4, A-6	0-5	100	95-100	65-90	35-60	25-35	5-15
	48-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lecrag----------	0-26	Clay-------------	CL, CH	A-7	0	100	100	90-100	60-90	45-60	20-35
	26-35	Sandy clay-------	CL, SC	A-7	0	100	100	85-95	40-55	40-50	20-25
	35-46	Sandy clay loam	SC	A-6	0	100	95-100	80-90	35-50	30-40	10-20
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
204*:											
Laveaga, very stony----------	0-16	Very stony clay loam.	CL	A-6	10-25	95-100	90-100	80-95	65-80	30-40	10-20
	16-30	Sandy clay, clay, clay loam.	CL, CH	A-7	0-5	100	95-100	80-95	50-85	40-55	20-30
	30-42	Sandy loam, sandy clay loam, loam.	SC, SM-SC, CL-ML, CL	A-4, A-6	0-5	100	95-100	65-90	35-60	25-35	5-15
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
Laveaga---------	0-16	Clay loam--------	CL	A-6	0	100	95-100	90-95	70-80	30-40	10-20
	16-30	Sandy clay, clay, clay loam.	CL, CH	A-7	0-5	100	95-100	80-95	50-85	40-55	20-30
	30-42	Sandy loam, sandy clay loam, loam.	SC, SM-SC, CL-ML, CL	A-4, A-6	0-5	100	95-100	65-90	35-60	25-35	5-15
	42	Weathered bedrock	---	---	---	---	---	---	---	---	---
205*:											
Laveaga---------	0-18	Sandy clay loam	SC	A-6	0	100	95-100	75-90	35-50	30-40	10-20
	18-27	Sandy clay, clay, clay loam.	CL, CH	A-7	0-5	100	95-100	80-95	50-85	40-55	20-30
	27-48	Sandy loam, sandy clay loam, loam.	SC, SM-SC, CL-ML, CL	A-4, A-6	0-5	100	95-100	65-90	35-60	25-35	5-15
	48-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Hytop-----------	0-5	Sandy loam-------	SM-SC	A-4	0-5	95-100	90-100	50-70	35-50	20-30	5-10
	5-10	Sandy clay loam	SM-SC, SC	A-4, A-6	0-5	95-100	90-100	70-90	35-50	25-35	5-15
	10-26	Clay loam, clay	CL, CH	A-7	0-5	90-100	85-100	75-95	60-90	40-55	20-30
	26	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
206-------------- Los Banos	0-10	Clay loam--------	CL	A-6, A-7	0	90-100	85-95	80-90	55-75	30-45	10-20
	10-42	Clay loam, clay	CL	A-6, A-7	0-5	95-100	95-100	90-95	70-90	35-50	15-25
	42-60	Stratified cobbly sandy clay loam to very gravelly clay loam.	CL, GC	A-6, A-7	10-30	50-95	45-90	40-85	35-70	30-45	10-20
207, 208--------- Los Banos	0-9	Clay loam--------	CL	A-6, A-7	0	90-100	85-95	80-90	55-75	30-45	10-20
	9-55	Clay loam, clay	CL	A-6, A-7	0-5	95-100	95-100	90-95	70-90	35-50	15-25
	55-63	Stratified cobbly sandy clay loam to very gravelly clay loam.	CL, GC	A-6, A-7	10-30	50-95	45-90	40-85	35-70	30-45	10-20
209*:											
Los Banos-------	0-9	Clay loam--------	CL	A-6, A-7	0	90-100	85-95	80-90	55-75	30-45	10-20
	9-55	Clay loam, clay	CL	A-6, A-7	0-5	95-100	95-100	90-95	70-90	35-50	15-25
	55-63	Stratified cobbly sandy clay loam to very gravelly clay loam.	CL, GC	A-6, A-7	10-30	50-95	45-90	40-85	35-70	30-45	10-20
Pleito----------	0-18	Clay loam--------	CL	A-6	0-10	80-100	75-100	60-90	55-75	25-40	10-20
	18-24	Sandy clay loam, loam, clay loam.	CL, SC	A-6	0-10	80-100	75-100	60-90	35-75	25-40	10-20
	24-60	Gravelly sandy clay loam, gravelly clay loam, gravelly loam.	SC, GC	A-6	0-10	60-75	60-75	50-65	35-50	25-40	10-20
210-------------- Los Banos Variant	0-16	Gravelly sandy clay loam.	GC, SC	A-2	0	55-80	50-75	45-65	25-35	30-40	10-15
	16-30	Gravelly sandy clay loam, gravelly clay loam.	GC, SC	A-2, A-6	0	55-80	50-75	45-70	25-50	30-40	10-20
	30-37	Gravelly sandy clay loam.	GC, SC	A-2	0	55-80	50-75	45-65	25-35	30-40	10-15
	37-65	Extremely gravelly coarse sandy loam, extremely gravelly sandy loam.	GP-GM	A-1	0-5	20-30	15-25	10-15	5-10	20-30	NP-5
211-------------- Marcuse	0-4	Silty clay-------	CL, CH	A-7	0	100	100	95-100	85-95	45-65	25-40
	4-60	Silty clay, clay	CL, CH	A-7	0	100	100	95-100	85-95	45-65	25-40
212-------------- Marcuse	0-11	Clay-------------	CL, CH	A-7	0	100	100	90-100	85-95	45-65	25-40
	11-49	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	85-95	45-65	25-40
	49-60	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	75-95	40-65	20-40
213, 214, 215---- Millsholm	0-19	Loam-------------	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
216*:											
Millsholm	0-19	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fifield	0-5	Sandy loam	SM	A-4	0-5	80-100	75-95	50-70	35-50	20-30	NP-5
	5-15	Very gravelly loam, very gravelly sandy clay loam.	GM-GC, GM	A-2, A-4	0-10	35-55	30-50	25-45	20-40	25-35	5-10
	15-30	Extremely gravelly loam, extremely gravelly sandy loam.	GM-GC, GM	A-2	5-20	20-35	15-30	10-25	5-20	25-35	5-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
217*:											
Millsholm	0-19	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Honker	0-7	Sandy loam	SM-SC	A-4	0-5	90-100	85-100	50-70	35-50	20-30	5-10
	7-14	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	95-100	90-100	75-95	40-70	30-40	10-20
	14-38	Clay, sandy clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	70-100	50-90	40-60	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
218*:											
Millsholm	0-19	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
219*:											
Millsholm	0-11	Loam	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
220. Mollic Xerofluvents											
221, 222, 223 Oneil	0-21	Silt loam	ML	A-4	0	95-100	90-100	85-100	75-90	30-40	5-10
	21-29	Silt loam, silty clay loam.	ML	A-4, A-6, A-7	0	90-95	90-95	90-95	80-90	30-45	5-15
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
224-------------- Oquin	0-20	Fine sandy loam	SM	A-4	0	95-100	90-100	65-85	35-50	20-30	NP-5
	20-39	Sandy loam, fine sandy loam, loam.	SM	A-4, A-2	0	100	95-100	60-70	30-50	20-30	NP-5
	39	Weathered bedrock	---	---	---	---	---	---	---	---	---
225-------------- Oquin	0-24	Fine sandy loam	SM	A-4	0	95-100	90-100	65-85	35-50	20-30	NP-5
	24-31	Sandy loam, fine sandy loam, loam.	SM	A-4, A-2	0	100	95-100	60-70	30-50	20-30	NP-5
	31	Weathered bedrock	---	---	---	---	---	---	---	---	---
226-------------- Orognen	0-16	Sandy loam-------	SM	A-4	0	95-100	85-100	55-70	35-50	20-30	NP-5
	16-19	Sandy clay loam, loam, gravelly sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	75-100	70-100	60-95	35-60	25-35	5-15
	19-34	Clay, sandy clay, clay loam.	CH, CL	A-7	0	90-100	85-100	75-100	60-95	40-65	20-40
	34-62	Gravelly clay loam, gravelly sandy clay loam, clay loam.	GC, SC, CL	A-6, A-7	0-5	55-90	50-85	40-80	35-70	30-45	10-20
227*:											
Orognen---------	0-3	Sandy loam-------	SM	A-4	0	95-100	85-100	55-70	35-50	20-30	NP-5
	3-13	Sandy clay loam, loam, gravelly sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	75-100	70-100	60-95	35-60	25-35	5-15
	13-39	Clay, sandy clay, clay loam.	CH, CL	A-7	0	90-100	85-100	75-100	60-95	40-65	20-40
	39-60	Gravelly clay loam, gravelly sandy clay loam, clay loam.	GC, SC, CL	A-6, A-7	0-5	55-90	50-85	40-80	35-70	30-45	10-20
Quiensabe-------	0-14	Sandy clay loam	SC	A-6	0	90-100	85-95	65-75	35-50	30-40	10-15
	14-22	Gravelly clay, clay loam, clay.	CL, CH	A-7	0	65-95	60-90	55-80	50-70	40-55	20-30
	22-27	Very gravelly clay loam, gravelly clay loam.	GC, CL	A-7, A-2	0	40-80	35-75	30-70	25-70	40-50	15-25
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
228-------------- Palazzo	0-14	Sandy loam-------	SM	A-4	0	100	100	50-70	35-50	20-30	NP-5
	14-26	Sandy loam, loam	SM, ML	A-4	0	100	100	50-85	35-60	20-35	NP-10
	26-60	Silt loam, clay loam.	CL	A-6	0	100	100	90-100	70-85	25-40	10-20
229, 230--------- Paver	0-16	Clay loam--------	CL	A-6	0	90-100	85-100	80-95	65-80	25-40	10-20
	16-76	Clay loam, loam	CL	A-6	0	90-100	85-100	75-95	50-80	25-40	10-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
231, 232--------- Peckham	0-13	Cobbly loam------	CL-ML, ML	A-4	25-50	95-100	90-100	75-95	50-65	25-35	5-10
	13-20	Very cobbly loam, very cobbly sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	55-75	95-100	90-100	75-95	35-65	25-35	5-15
	20-24	Extremely cobbly clay.	CH, GC	A-7	65-80	70-80	45-70	35-70	35-65	40-65	20-40
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
233*: Peckham---------	0-13	Cobbly loam------	CL-ML, ML	A-4	25-50	95-100	90-100	75-95	50-65	25-35	5-10
	13-20	Very cobbly loam, very cobbly sandy clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	55-75	95-100	90-100	75-95	35-65	25-35	5-15
	20-24	Extremely cobbly clay.	CH, GC	A-7	65-80	70-80	45-70	35-70	35-65	40-65	20-40
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cole Variant----	0-6	Clay loam--------	CL	A-6	0-5	90-100	85-100	75-95	60-80	30-40	10-20
	6-32	Clay, clay loam	CL, CH	A-7	0-5	90-100	85-100	75-95	60-80	40-55	20-30
	32-64	Stratified loam to clay.	CL	A-6	0-5	90-100	85-100	70-90	55-80	25-40	10-20
234-------------- Pedcat	0-5	Loam-------------	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	5-23	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	45-55	20-30
	23-29	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	80-100	70-95	35-50	15-25
	29-60	Stratified sandy clay loam to clay.	CL	A-6, A-7	0	100	100	75-100	50-85	35-50	15-25
235-------------- Pedcat	0-4	Loam-------------	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	4-22	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	45-55	20-30
	22-60	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	80-100	70-95	35-50	15-25
236-------------- Pedcat	0-5	Clay loam--------	CL	A-6, A-7	0	100	100	90-100	70-80	30-45	10-20
	5-23	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	45-55	20-30
	23-29	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	80-100	70-95	35-50	15-25
	29-60	Stratified sandy clay loam to clay.	CL	A-6, A-7	0	100	100	75-100	50-85	35-50	15-25
237-------------- Pedcat	0-18	Clay-------------	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-30
	18-23	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	80-100	70-95	35-50	15-25
	23-60	Stratified sandy clay loam to clay.	CL	A-6, A-7	0	100	100	75-100	50-85	35-50	15-25
238*. Pits											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
239-------------- Pleito	0-18	Gravelly clay loam.	SC	A-6	0-10	60-80	55-75	50-70	35-50	30-40	10-20
	18-24	Clay loam, sandy clay loam.	SC, CL	A-6	0-10	80-95	75-90	60-85	35-65	30-40	10-20
	24-60	Gravelly sandy clay loam, gravelly clay loam.	SC, GC	A-6	0-10	60-80	55-75	50-70	35-50	30-40	10-20
240-------------- Pleito	0-11	Gravelly clay loam.	SC	A-6	0-10	60-80	55-75	50-70	35-50	30-40	10-20
	11-40	Clay loam, sandy clay loam.	SC, CL	A-6	0-10	80-95	75-90	60-85	35-65	30-40	10-20
	40-60	Very gravelly clay loam, extremely gravelly clay loam.	GP-GC, GC	A-2	0-10	20-55	15-50	10-45	5-35	30-40	10-20
241*:											
Quinto----------	0-6	Gravelly sandy loam.	SM-SC, GM-GC	A-2	0-5	55-80	50-75	35-50	25-35	20-30	5-10
	6-17	Gravelly sandy clay loam.	GC, SC	A-2, A-6	0-10	55-80	50-75	45-65	25-50	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Illito----------	0-5	Extremely stony loam.	CL-ML, CL	A-4, A-6	25-65	80-95	75-90	65-80	50-65	25-35	5-15
	5-8	Very stony clay loam, very stony clay, very cobbly clay.	CL, CH	A-7	40-60	80-95	75-90	70-85	55-75	40-55	20-30
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
242*:											
Quinto----------	0-6	Gravelly sandy loam.	SM-SC, GM-GC	A-2	0-5	55-80	50-75	35-50	25-35	20-30	5-10
	6-17	Gravelly sandy clay loam.	GC, SC	A-2, A-6	0-10	55-80	50-75	45-65	25-50	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Millsholm-------	0-19	Loam------------	ML, CL-ML	A-4	0	80-100	75-100	70-95	50-75	25-35	5-10
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
243*:											
Quinto----------	0-6	Gravelly sandy loam.	SM-SC, GM-GC	A-2	0-5	55-80	50-75	35-50	25-35	20-30	5-10
	6-17	Gravelly sandy clay loam.	GC, SC	A-2, A-6	0-10	55-80	50-75	45-65	25-50	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
244*:											
Rock outcrop.											
Ararat----------	0-7	Extremely stony loam.	CL-ML, ML	A-4	25-45	95-100	90-100	75-95	55-75	25-35	5-10
	7-24	Very stony loam, very bouldery loam, very stony sandy clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	50-70	95-100	90-100	70-90	40-65	25-35	5-15
	24-45	Extremely stony sandy clay loam, extremely bouldery sandy clay loam, extremely stony loam.	SC, SM-SC, CL-ML, CL	A-4, A-6, A-2	75-85	95-100	90-100	70-90	30-55	25-35	5-15
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Illito----------	0-5	Extremely stony loam.	CL-ML, CL	A-4, A-6	25-65	80-95	75-90	65-80	50-65	25-35	5-15
	5-8	Very stony clay loam, very stony clay, very cobbly clay.	CL, CH	A-7	40-60	80-95	75-90	70-85	55-75	40-55	20-30
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
245*:											
Rock outcrop.											
Wisflat---------	0-3	Sandy loam-------	SM	A-4	0-5	90-100	75-95	50-70	35-50	20-30	NP-5
	3-11	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-2, A-4	5-10	75-100	60-95	50-80	30-60	20-35	NP-10
	11-13	Weathered bedrock	---	---	---	---	---	---	---	---	---
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
246-------------- San Emigdio	0-17	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	75-90	35-60	20-30	NP-5
	17-60	Fine sandy loam, sandy loam, loam.	SM, ML	A-4	0	80-100	75-100	60-90	35-60	20-30	NP-5
247-------------- San Emigdio	0-14	Loam-------------	ML	A-4	0	95-100	90-100	75-90	50-65	20-30	NP-5
	14-60	Stratified sandy loam to silt loam.	SM, ML	A-4	0	80-100	75-100	60-90	35-60	20-30	NP-5
248-------------- Santanela	0-6	Loam-------------	ML	A-4	0	100	100	80-90	50-65	25-35	NP-10
	6-19	Loam, sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	70-100	35-80	30-40	10-15
	19-61	Sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	100	50-90	35-70	25-40	5-15
249-------------- San Timoteo	0-16	Sandy loam-------	SM	A-4	0	80-100	75-95	50-80	35-50	20-30	NP-5
	16-32	Loam, sandy loam	SM, ML	A-4	0	80-100	75-95	50-85	40-60	20-35	NP-10
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
250*, 251*:											
San Timoteo-----	0-16	Sandy loam--------	SM	A-4	0	80-100	75-95	50-80	35-50	20-30	NP-5
	16-32	Loam, sandy loam	SM, ML	A-4	0	80-100	75-95	50-85	40-60	20-35	NP-10
	32	Weathered bedrock	---	---	---	---	---	---	---	---	---
Wisflat---------	0-6	Sandy loam--------	SM	A-4	0-5	90-100	75-95	50-70	35-50	20-30	NP-5
	6-14	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-2, A-4	5-10	75-100	60-95	50-80	30-60	20-35	NP-10
	14-16	Weathered bedrock	---	---	---	---	---	---	---	---	---
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
252*:											
Sehorn----------	0-7	Clay--------------	CL, CH	A-7	0	100	95-100	90-100	85-95	45-60	25-35
	7-26	Clay, silty clay	CL, CH	A-7	0	100	95-100	90-100	85-95	45-60	25-35
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Contra Costa----	0-19	Loam--------------	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-90	50-70	25-35	5-15
	19-32	Clay, clay loam	CL, CH	A-7	0	90-100	85-100	80-100	75-95	40-55	20-30
	32-39	Shaly clay, shaly clay loam.	CL, CH, SC, GC	A-7	5-15	65-100	60-75	55-70	45-65	40-55	20-30
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
253-------------- Stanislaus	0-19	Clay loam---------	CL	A-7	0	95-100	85-100	85-100	60-80	40-50	15-25
	19-39	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-90	45-55	20-30
	39-65	Loam, clay loam	ML, CL	A-6, A-7	0	100	100	85-100	65-80	35-45	10-20
254-------------- Stanislaus	0-16	Clay loam---------	CL	A-7	0	95-100	90-100	85-100	65-80	40-50	15-25
	16-50	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-90	45-55	20-30
	50-60	Loam, clay loam	ML, CL	A-6, A-7	0	100	100	85-100	65-80	35-45	10-20
255*:											
Stanislaus------	0-19	Clay loam---------	CL	A-7	0	95-100	85-100	85-100	60-80	40-50	15-25
	19-39	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-90	45-55	20-30
	39-65	Loam, clay loam	ML, CL	A-6, A-7	0	100	100	85-100	65-80	35-45	10-20
Dosamigos-------	0-15	Clay--------------	CL	A-7	0	100	100	90-100	75-95	40-50	20-30
	15-27	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-55	15-30
	27-60	Clay loam, clay, sandy clay.	CL, CH	A-7, A-6	0	100	95-100	85-100	50-95	35-55	15-30
Urban land.											
256-------------- Triangle	0-34	Clay--------------	CH	A-7	0	100	100	90-100	70-95	50-65	25-40
	34-60	Clay, clay loam	CH, CL	A-7	0	100	100	90-100	70-95	40-65	20-40
257-------------- Triangle	0-30	Clay--------------	CH	A-7	0	100	100	90-100	70-95	50-65	25-40
	30-60	Stratified loam to silty clay.	CL, CH	A-6, A-7	0	100	100	85-100	60-90	35-60	15-35
258-------------- Trulae	0-15	Silty clay--------	CH	A-7	0	100	100	95-100	90-95	40-60	20-35
	15-45	Clay--------------	CH	A-7	0	100	100	90-100	75-95	50-70	25-40
	45-63	Clay loam---------	CL, ML	A-6, A-7	0	90-100	90-100	80-100	65-85	35-50	10-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
259*:											
Tunehill	0-7	Loam	CL-ML, ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	7-11	Loam, silt loam	CL-ML, CL	A-4, A-6	0	95-100	90-95	75-85	55-75	25-35	5-15
	11	Weathered bedrock	---	---	---	---	---	---	---	---	---
Quiensabe	0-5	Clay loam	CL	A-6	0	95-100	90-100	85-95	65-75	30-40	10-15
	5-34	Gravelly clay, clay loam, clay.	CL, CH	A-7	0	65-95	60-90	55-80	50-70	40-55	20-30
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
260 Turlock	0-4	Sandy loam	SM, SM-SC	A-4	0	100	100	50-80	35-50	20-30	NP-10
	4-36	Loam, clay loam	CL	A-6	0	100	100	80-100	60-80	30-40	10-15
	36-55	Sandy clay loam, silty clay loam, clay loam.	CL, SC	A-6	0	100	100	70-100	35-80	30-40	10-15
	55-60	Stratified loam to silty clay loam.	CL	A-6	0	100	100	80-100	60-80	30-40	10-15
261 Turlock	0-3	Loam	ML, CL-ML	A-4	0	100	100	60-80	50-60	25-35	5-10
	3-35	Loam, clay loam	CL	A-6	0	100	100	80-100	60-80	30-40	10-15
	35-54	Sandy clay loam, silty clay loam, clay loam.	CL, SC	A-6	0	100	100	70-100	35-80	30-40	10-15
	54-60	Stratified loam to silty clay loam.	CL	A-6	0	100	100	80-100	60-80	30-40	10-15
262 Turmound	0-13	Sandy loam	SM	A-2, A-4	0	100	100	50-80	25-50	20-30	NP-5
	13-38	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-100	35-75	30-40	10-15
	38-60	Stratified loam to clay.	CL, SC	A-6, A-7	0	100	100	70-100	35-70	35-50	15-25
263 Vernalis	0-7	Loam	ML	A-4	0	100	95-100	80-100	55-80	25-35	NP-10
	7-28	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-80	25-40	5-20
	28-60	Stratified sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	75-100	50-80	20-40	5-20
264*:											
Vernalis	0-7	Loam	ML	A-4	0	100	95-100	80-100	55-80	25-35	NP-10
	7-28	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-80	25-40	5-20
	28-60	Stratified sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	75-100	50-80	20-40	5-20
Pedcat	0-4	Clay loam	CL	A-6, A-7	0	100	100	90-100	70-80	30-45	10-20
	4-22	Clay, silty clay	CL, CH	A-7	0	100	100	95-100	85-95	45-55	20-30
	22-60	Clay, clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	80-100	70-95	35-50	15-25
265 Volta	0-1	Clay loam	ML, CL	A-6, A-7	0	100	100	90-100	70-85	35-45	10-20
	1-26	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	70-95	40-55	20-30
	26-46	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-95	35-50	15-25
	46-60	Cemented	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
266-------------- Volta	0-6	Clay loam--------	CL	A-7	0	100	100	90-100	70-80	40-50	15-25
	6-33	Clay loam, clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	20-30
	33-46	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-95	35-50	15-25
	46-84	Cemented---------	---	---	---	---	---	---	---	---	---
267-------------- Wekoda	0-11	Clay-------------	CH	A-7	0	100	100	90-100	75-95	50-65	30-40
	11-62	Clay-------------	CH	A-7	0	100	100	90-100	75-95	50-65	25-40
268*, 269*:											
Wisflat---------	0-3	Sandy loam-------	SM	A-4	0-5	90-100	75-95	50-70	35-50	20-30	NP-5
	3-11	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-2, A-4	5-10	75-100	60-95	50-80	30-60	20-35	NP-10
	11-13	Weathered bedrock	---	---	---	---	---	---	---	---	---
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Arburua---------	0-10	Loam-------------	ML, CL-ML	A-4	0	95-100	85-100	80-95	65-75	25-35	5-10
	10-32	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	75-100	70-100	50-75	25-45	5-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
270*, 271*, 272*:											
Wisflat---------	0-6	Sandy loam-------	SM	A-4	0-5	90-100	75-95	50-70	35-50	20-30	NP-5
	6-14	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-2, A-4	5-10	75-100	60-95	50-80	30-60	20-35	NP-10
	14-16	Weathered bedrock	---	---	---	---	---	---	---	---	---
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Arburua---------	0-10	Loam-------------	ML, CL-ML	A-4	0	95-100	85-100	80-95	65-75	25-35	5-10
	10-32	Loam, clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	75-100	70-100	50-75	25-45	5-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
273*:											
Wisflat---------	0-6	Sandy loam-------	SM	A-4	0-5	90-100	75-95	50-70	35-50	20-30	NP-5
	6-14	Sandy loam, loam, gravelly sandy loam.	SM, ML	A-2, A-4	5-10	75-100	60-95	50-80	30-60	20-35	NP-10
	14-16	Weathered bedrock	---	---	---	---	---	---	---	---	---
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Oneil-----------	0-21	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	75-90	30-40	5-10
	21-29	Silt loam, silty clay loam.	ML	A-4, A-6, A-7	0	90-95	90-95	90-95	80-90	30-45	5-15
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
274-------------- Woo	0-16	Loam-------------	CL-ML, ML	A-4	0	100	95-100	75-95	55-75	25-35	5-10
	16-67	Clay loam, loam	CL-ML, CL	A-6, A-4	0	80-100	75-100	65-95	50-75	25-40	5-20

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
275 Woo	0-19	Loam	CL-ML, ML	A-4	0	100	95-100	75-95	55-75	25-35	5-10
	19-38	Loam, clay loam	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	50-75	25-40	5-20
	38-62	Stratified gravelly sandy loam to gravelly loamy sand.	SM	A-1, A-2	0	60-80	55-75	30-50	15-35	20-30	NP-5
276 Woo	0-16	Sandy clay loam	SC	A-6	0	100	95-100	80-90	35-50	30-40	10-20
	16-42	Loam, clay loam	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	50-75	25-40	5-20
	42-60	Stratified gravelly sandy loam to gravelly loamy sand.	SM	A-1, A-2	0	60-80	55-75	30-50	15-35	20-30	NP-5
277, 278 Woo	0-15	Clay loam	CL	A-6	0	100	95-100	90-100	70-80	30-40	10-20
	15-60	Clay loam, loam	CL-ML, CL	A-6, A-4	0	80-100	75-100	65-95	50-75	25-40	5-20
279 Woo	0-19	Clay loam	CL	A-6	0	100	95-100	90-100	70-80	30-40	10-20
	19-48	Loam, clay loam, sandy clay loam.	CL, CL-ML	A-6, A-4	0	100	95-100	75-95	50-75	25-40	5-20
	48-62	Clay, clay loam	CL, CH	A-7	0	100	95-100	85-95	75-90	40-55	20-30
280 Woo	0-17	Clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	20-30
	17-60	Clay loam, loam, silt loam.	CL, CL-ML	A-6, A-4	0	80-100	75-100	65-95	55-75	25-40	5-20
281*:											
Woo	0-16	Sandy clay loam	SC	A-6	0	100	95-100	80-90	35-50	30-40	10-20
	16-42	Loam, clay loam	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	50-75	25-40	5-20
	42-60	Stratified gravelly sandy loam to gravelly loamy sand.	SM	A-1, A-2	0	60-80	55-75	30-50	15-35	20-30	NP-5
Anela	0-16	Gravelly loam	GM-GC, GC	A-4, A-6	0-10	55-80	50-75	45-70	35-50	25-35	5-15
	16-42	Very gravelly clay loam, extremely gravelly clay loam.	GC	A-2	0-15	30-45	25-40	20-35	15-30	30-40	10-20
	42-60	Stratified very gravelly clay loam to extremely gravelly loamy coarse sand.	GC	A-2	10-20	20-35	15-30	10-25	5-20	30-35	10-15
Urban land.											
282*:											
Woo loam	0-16	Loam	CL-ML, ML	A-4	0	100	95-100	75-95	55-75	25-35	5-10
	16-67	Clay loam, loam	CL-ML, CL	A-6, A-4	0	80-100	75-100	65-95	50-75	25-40	5-20
Woo clay loam	0-19	Clay loam	CL	A-6	0	100	95-100	90-100	70-80	30-40	10-20
	19-48	Loam, clay loam, sandy clay loam.	CL, CL-ML	A-6, A-4	0	100	95-100	75-95	50-75	25-40	5-20
	48-62	Clay, clay loam	CL, CH	A-7	0	100	95-100	85-95	75-90	40-55	20-30
Urban land.											
283, 284. Xerofluvents											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
285-------------- Yokut	0-6	Sandy loam-------	SM, SM-SC	A-4	0-5	90-100	85-95	55-75	35-50	20-30	NP-10
	6-16	Loam, sandy clay loam.	CL-ML, ML, SM-SC, SM	A-4	0-5	90-100	85-95	70-85	35-60	25-35	5-10
	16-68	Stratified gravelly loam to extremely gravelly sandy clay loam.	GM-GC, GC	A-2	5-25	25-65	20-60	15-50	10-35	25-40	5-15
286-------------- Yokut	0-8	Loam-------------	CL-ML, ML	A-4	0-5	90-100	85-95	75-85	50-70	25-35	5-10
	8-19	Loam, sandy clay loam.	CL-ML, ML, SM-SC, SM	A-4	0-5	90-100	85-95	70-85	35-60	25-35	5-10
	19-75	Stratified gravelly loam to extremely gravelly sandy clay loam.	GM-GC, GC	A-2	5-25	25-65	20-60	15-50	10-35	25-40	5-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
101 Agnal	0-2	35-40	<0.06	0.02-0.06	6.6-9.0	>16	High	0.37	5	1-5
	2-31	35-50	<0.06	0.02-0.06	7.9-9.0	>16	High	0.37		
	31-61	35-50	<0.06	0.02-0.06	7.4-9.0	>16	High	0.37		
102*:										
Akad	0-3	20-30	0.6-2.0	0.13-0.16	6.1-7.3	<2	Moderate	0.28	2	1-2
	3-24	27-35	0.2-0.6	0.04-0.06	6.6-7.3	<2	Low	0.10		
	24	---	---	---	---	---	---	---		
Conosta	0-14	27-35	0.2-0.6	0.15-0.19	6.6-7.8	<2	Moderate	0.28	2	1-2
	14-27	35-45	0.06-0.2	0.10-0.14	7.4-8.4	<2	High	0.20		
	27-32	35-45	0.06-0.2	0.06-0.10	7.4-8.4	<2	Moderate	0.10		
	32	---	---	---	---	---	---	---		
103 Alros	0-12	27-35	0.2-0.6	0.14-0.16	7.4-9.0	2-4	Moderate	0.37	5	<1
	12-39	18-35	0.06-0.2	0.11-0.15	7.9-9.0	4-8	Low	0.37		
	39-60	15-35	0.06-0.2	0.08-0.15	8.5-9.0	2-8	Moderate	0.37		
104 Alros	0-17	27-35	0.2-0.6	0.14-0.16	7.4-9.0	2-4	Moderate	0.37	5	<1
	17-22	18-35	0.06-0.2	0.11-0.15	7.9-9.0	4-8	Low	0.37		
	22-60	15-35	0.06-0.2	0.08-0.15	8.5-9.0	2-8	Moderate	0.37		
105*:										
Altamont Variant	0-21	45-55	0.06-0.2	0.14-0.16	6.6-8.4	<2	High	0.28	3	.5-1
	21-42	35-50	0.06-0.2	0.15-0.16	6.6-8.4	<2	High	0.32		
	42-47	---	---	---	---	---	---	---		
	47	---	---	---	---	---	---	---		
Hytop	0-5	15-20	2.0-6.0	0.11-0.12	6.6-7.8	<2	Low	0.28	2	1-3
	5-10	20-25	0.2-0.6	0.16-0.17	6.6-7.8	<2	Moderate	0.28		
	10-26	35-50	<0.06	0.06-0.08	6.6-7.8	<2	High	0.32		
	26	---	---	---	---	---	---	---		
106 Anela	0-16	18-27	0.6-2.0	0.10-0.14	6.1-7.3	<2	Low	0.20	5	1-3
	16-42	27-35	0.6-2.0	0.08-0.12	6.6-8.4	<2	Low	0.15		
	42-60	5-30	0.6-2.0	0.04-0.07	7.4-8.4	<2	Low	0.10		
107 Anela	0-12	10-18	2.0-6.0	0.04-0.08	6.1-7.3	<2	Low	0.10	5	1-3
	12-42	15-27	0.6-2.0	0.04-0.07	7.4-8.4	<2	Low	0.10		
	42-60	5-30	0.6-2.0	0.04-0.07	7.4-8.4	<2	Low	0.10		
108 Anela	0-23	10-18	2.0-6.0	0.04-0.08	6.1-7.3	<2	Low	0.10	5	1-3
	23-32	15-27	0.6-2.0	0.04-0.07	7.4-8.4	<2	Low	0.10		
	32-60	5-30	0.6-2.0	0.04-0.07	7.4-8.4	<2	Low	0.10		
109, 110, 111 Apollo	0-10	27-30	0.6-2.0	0.17-0.19	7.4-8.4	<2	Moderate	0.43	3	1-2
	10-41	27-35	0.2-0.6	0.18-0.20	7.9-8.4	<2	Moderate	0.37		
	41	---	---	---	---	---	---	---		
112 Ararat	0-7	16-24	0.6-2.0	0.11-0.14	5.6-6.5	<2	Low	0.15	3	1-4
	7-24	18-26	0.2-0.6	0.08-0.11	6.1-6.5	<2	Low	0.10		
	24-45	18-26	0.2-0.6	0.05-0.06	6.1-7.3	<2	Low	0.10		
	45	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
113*:										
Ararat----------	0-7	16-24	0.6-2.0	0.11-0.14	5.6-6.5	<2	Low-----------	0.15	3	1-4
	7-24	18-26	0.2-0.6	0.08-0.11	6.1-6.5	<2	Low-----------	0.10		
	24-45	18-26	0.2-0.6	0.05-0.06	6.1-7.3	<2	Low-----------	0.10		
	45	---	---	---	---	---	-------------	----		
Gonzaga---------	0-16	15-27	0.6-2.0	0.13-0.16	6.1-7.3	<2	Low-----------	0.32	2	1-5
	16-22	15-27	0.2-0.6	0.11-0.14	6.6-7.3	<2	Moderate------	0.20		
	22-39	35-55	<0.06	0.06-0.08	6.6-7.8	<2	High----------	0.15		
	39	---	---	---	---	---	-------------	----		
114*, 115*:										
Ararat----------	0-7	16-24	0.6-2.0	0.11-0.14	5.6-6.5	<2	Low-----------	0.15	3	1-4
	7-24	18-26	0.2-0.6	0.08-0.11	6.1-6.5	<2	Low-----------	0.10		
	24-45	18-26	0.2-0.6	0.05-0.06	6.1-7.3	<2	Low-----------	0.10		
	45	---	---	---	---	---	-------------	----		
Peckham---------	0-13	10-20	0.6-2.0	0.12-0.15	5.6-7.3	<2	Low-----------	0.24	2	.5-2
	13-20	18-28	0.2-0.6	0.07-0.09	5.6-7.3	<2	Moderate------	0.10		
	20-24	40-60	0.06-0.2	0.04-0.05	6.1-7.3	<2	Moderate------	0.05		
	24	---	---	---	---	---	-------------	----		
116------------- Arbuckle Variant	0-19	12-20	2.0-6.0	0.09-0.12	6.6-7.8	<2	Low-----------	0.32	5	.5-1
	19-37	18-25	0.2-0.6	0.10-0.13	7.4-8.4	<2	Low-----------	0.17		
	37-60	5-15	6.0-20	0.03-0.04	7.4-8.4	<2	Low-----------	0.10		
117, 118, 119, 120------------ Arburua	0-10	18-27	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low-----------	0.37	2	<1
	10-32	18-30	0.6-2.0	0.12-0.18	7.9-8.4	<2	Moderate------	0.37		
	32	---	---	---	---	---	-------------	----		
121, 122--------- Asolt	0-3	40-60	0.06-0.2	0.10-0.12	6.6-8.4	<2	High----------	0.15	3	1-3
	3-42	40-60	0.06-0.2	0.10-0.12	6.6-8.4	<2	High----------	0.15		
	42	---	---	---	---	---	-------------	----		
123, 124, 125, 126------------ Ayar	0-15	40-50	0.06-0.2	0.14-0.17	7.4-8.4	<2	High----------	0.28	3	1-3
	15-47	35-50	0.06-0.2	0.14-0.17	7.4-8.4	<2	High----------	0.28		
	47	---	---	---	---	---	-------------	----		
127*, 128*, 129*:										
Ayar------------	0-15	40-50	0.06-0.2	0.14-0.17	7.4-8.4	<2	High----------	0.28	3	1-3
	15-47	35-50	0.06-0.2	0.14-0.17	7.4-8.4	<2	High----------	0.28		
	47	---	---	---	---	---	-------------	----		
Arburua---------	0-10	18-27	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low-----------	0.37	2	<1
	10-32	18-30	0.6-2.0	0.12-0.18	7.9-8.4	<2	Moderate------	0.37		
	32	---	---	---	---	---	-------------	----		
130*:										
Ayar------------	0-15	40-50	0.06-0.2	0.14-0.17	7.4-8.4	<2	High----------	0.28	3	1-3
	15-47	35-50	0.06-0.2	0.14-0.17	7.4-8.4	<2	High----------	0.28		
	47-51	---	---	---	---	---	-------------	----		
Oneil-----------	0-21	20-27	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low-----------	0.43	2	1-3
	21-29	20-35	0.2-0.6	0.14-0.20	7.9-8.4	<2	Moderate------	0.49		
	29	---	---	---	---	---	-------------	----		
131------------- Ballvar	0-15	18-25	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low-----------	0.32	5	1-2
	15-45	20-30	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate------	0.37		
	45-62	20-27	0.6-2.0	0.14-0.16	7.4-8.4	<2	Moderate------	0.37		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
132*:										
Ballvar	0-15	18-25	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low	0.32	5	1-2
	15-45	20-30	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	0.37		
	45-62	20-27	0.6-2.0	0.14-0.16	7.4-8.4	<2	Moderate	0.37		
Pedcat	0-4	18-27	0.6-2.0	0.09-0.14	6.1-7.3	8-16	Low	0.43	5	<1
	4-22	40-50	<0.06	0.09-0.13	7.9-8.4	>8	High	0.32		
	22-60	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High	0.32		
133 Bapos	0-12	20-30	0.6-2.0	0.14-0.16	7.4-7.8	<2	Moderate	0.32	2	.5-1
	12-24	38-55	<0.06	0.06-0.08	7.4-8.4	<2	High	0.24		
	24-60	27-40	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.10		
134, 135 Bapos	0-12	27-35	0.6-2.0	0.15-0.19	6.6-8.4	<2	Moderate	0.32	2	.5-1
	12-45	38-55	<0.06	0.06-0.08	7.4-8.4	<2	High	0.24		
	45-60	27-40	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.10		
136*:										
Bapos	0-12	27-35	0.6-2.0	0.15-0.19	6.6-8.4	<2	Moderate	0.32	2	.5-1
	12-45	38-55	<0.06	0.06-0.08	7.4-8.4	<2	High	0.24		
	45-60	27-40	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate	0.10		
Arburua	0-10	18-27	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low	0.37	2	<1
	10-32	18-30	0.6-2.0	0.12-0.18	7.9-8.4	<2	Moderate	0.37		
	32	---	---	---	---	---	---------------	----		
137 Bisgani	0-20	2-10	6.0-20	0.06-0.08	7.4-8.4	<2	Low	0.17	5	1-3
	20-60	2-10	6.0-20	0.06-0.08	7.4-8.4	<4	Low	0.17		
138 Bisgani	0-9	27-35	0.2-0.6	0.16-0.19	7.4-8.4	<2	Moderate	0.32	5	1-3
	9-15	2-10	2.0-6.0	0.09-0.11	7.4-8.4	<2	Low	0.20		
	15-60	2-10	6.0-20	0.06-0.08	7.4-8.4	<4	Low	0.17		
139 Bolfar	0-25	27-35	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate	0.32	5	1-3
	25-41	18-35	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate	0.32		
	41-60	18-35	0.2-0.6	0.14-0.17	7.9-8.4	<2	Moderate	0.37		
140 Bolfar	0-26	27-35	0.2-0.6	0.13-0.17	7.4-8.4	<8	Moderate	0.32	5	1-3
	26-60	18-35	0.2-0.6	0.12-0.16	7.9-8.4	<8	Moderate	0.37		
141, 142 Britto	0-5	27-35	0.06-0.2	0.14-0.18	6.6-8.4	2-4	Moderate	0.43	5	<1
	5-22	35-55	<0.06	0.05-0.14	7.9-9.0	>2	High	0.37		
	22-62	30-50	<0.06	0.05-0.10	7.9-9.0	>8	High	0.37		
143 Britto	0-5	27-35	0.06-0.2	0.14-0.18	6.6-8.4	2-4	Moderate	0.43	5	<1
	5-22	35-55	<0.06	0.05-0.14	7.9-9.0	>2	High	0.37		
	22-62	30-50	<0.06	0.05-0.10	7.9-9.0	>8	High	0.37		
144 Capay	0-15	35-40	0.06-0.2	0.17-0.19	7.9-8.4	<2	High	0.28	5	1-2
	15-36	40-60	0.06-0.2	0.14-0.16	7.9-8.4	<2	High	0.24		
	36-60	35-40	0.06-0.2	0.17-0.19	7.9-8.4	<2	High	0.28		
145 Capay	0-22	40-60	0.06-0.2	0.14-0.16	7.9-8.4	<2	High	0.24	5	1-2
	22-60	40-60	0.06-0.2	0.14-0.16	7.9-8.4	<2	High	0.24		
146 Carranza	0-21	20-27	0.6-2.0	0.12-0.15	6.6-7.3	<2	Low	0.20	4	1-2
	21-55	25-35	0.6-2.0	0.13-0.15	6.6-7.8	<2	Moderate	0.20		
	55-60	20-30	0.2-0.6	0.04-0.06	6.6-7.8	<2	Low	0.10		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
147-------------- Carranza	0-12	27-35	0.6-2.0	0.14-0.17	6.6-7.3	<2	Moderate------	0.20	4	1-2
	12-38	25-35	0.6-2.0	0.13-0.15	6.6-7.8	<2	Moderate------	0.20		
	38-60	20-30	0.2-0.6	0.04-0.06	6.6-7.8	<2	Low-----------	0.10		
148*:										
Carranza---------	0-22	27-35	0.6-2.0	0.14-0.17	6.6-7.3	<2	Moderate------	0.20	4	1-2
	22-38	25-35	0.6-2.0	0.13-0.15	6.6-7.8	<2	Moderate------	0.20		
	38-60	5-15	6.0-20	0.01-0.03	6.6-7.8	<2	Low-----------	0.10		
Woo-------------	0-19	27-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate------	0.32	5	1-2
	19-38	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
	38-62	5-15	2.0-6.0	0.06-0.08	7.4-8.4	<2	Low-----------	0.20		
149-------------- Chaqua	0-19	22-27	0.6-2.0	0.14-0.16	7.4-8.4	<2	Low-----------	0.37	3	.5-1
	19-47	18-30	0.2-0.6	0.14-0.17	7.4-8.4	<2	Moderate------	0.37		
	47	---	---	---	---	---	--------------	----		
150, 151--------- Chateau	0-15	40-60	0.06-0.2	0.06-0.10	7.4-9.0	8-16	High----------	0.32	5	<1
	15-23	35-60	0.06-0.2	0.06-0.10	8.5-9.0	8-16	High----------	0.37		
	23-62	40-60	0.06-0.2	0.06-0.10	8.5-9.0	8-16	High----------	0.37		
152-------------- Checker	0-15	18-27	0.6-2.0	0.03-0.05	7.9-8.4	>16	Low-----------	0.43	5	<1
	15-55	20-30	0.2-0.6	0.04-0.06	7.9-9.0	>16	Moderate------	0.43		
	55-61	35-45	0.06-0.2	0.09-0.11	7.9-9.0	8-16	High----------	0.43		
153-------------- Chinvar	0-13	20-27	0.6-2.0	0.14-0.16	7.9-8.4	<2	Low-----------	0.32	5	1-3
	13-38	20-30	0.6-2.0	0.13-0.15	7.9-8.4	2-8	Moderate------	0.37		
	38-60	10-18	0.6-2.0	0.07-0.10	7.4-8.4	<2	Low-----------	0.20		
154-------------- Cole Variant	0-6	27-35	0.2-0.6	0.18-0.21	6.6-7.3	<2	Moderate------	0.28	5	2-5
	6-32	35-45	0.06-0.2	0.14-0.16	6.6-7.8	<2	High----------	0.28		
	32-64	20-40	<0.06	0.14-0.16	6.6-7.8	<2	Moderate------	0.32		
155, 156, 157---- Conosta	0-14	27-35	0.2-0.6	0.15-0.19	6.6-7.8	<2	Moderate------	0.28	2	1-2
	14-27	35-45	0.06-0.2	0.10-0.14	7.4-8.4	<2	High----------	0.20		
	27-32	35-45	0.06-0.2	0.06-0.10	7.4-8.4	<2	Moderate------	0.10		
	32	---	---	---	---	---	--------------	----		
158*:										
Conosta----------	0-14	27-35	0.2-0.6	0.15-0.19	6.6-7.8	<2	Moderate------	0.28	2	1-2
	14-27	35-45	0.06-0.2	0.10-0.14	7.4-8.4	<2	High----------	0.20		
	27-32	35-45	0.06-0.2	0.06-0.10	7.4-8.4	<2	Moderate------	0.10		
	32	---	---	---	---	---	--------------	----		
Arburua----------	0-10	18-27	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low-----------	0.37	2	<1
	10-32	18-30	0.6-2.0	0.12-0.18	7.9-8.4	<2	Moderate------	0.37		
	32	---	---	---	---	---	--------------	----		
159, 160--------- Contra Costa	0-19	20-27	0.6-2.0	0.14-0.16	5.6-7.3	<2	Moderate------	0.28	2	.5-1
	19-39	35-45	0.06-0.2	0.15-0.17	5.6-7.3	<2	High----------	0.28		
	39	---	---	---	---	---	--------------	----		
161, 162--------- Damluis	0-22	35-40	0.2-0.6	0.17-0.20	7.4-8.4	<2	High----------	0.32	5	1-3
	22-44	45-55	0.06-0.2	0.15-0.17	7.9-8.4	<2	High----------	0.28		
	44-52	28-40	0.2-0.6	0.16-0.17	7.9-8.4	<2	Moderate------	0.32		
	52-60	15-25	0.2-0.6	0.05-0.06	7.9-8.4	<2	Low-----------	0.10		
163-------------- Damluis	0-21	35-40	0.2-0.6	0.15-0.16	7.4-8.4	<2	High----------	0.20	5	1-3
	21-46	45-55	0.06-0.2	0.12-0.14	7.9-8.4	<2	High----------	0.20		
	46-60	28-40	0.2-0.6	0.14-0.16	7.9-8.4	<2	Moderate------	0.15		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
164, 165---------- Damluis	0-22	35-40	0.2-0.6	0.15-0.16	7.4-8.4	<2	High----------	0.20	5	1-3
	22-44	45-55	0.06-0.2	0.12-0.14	7.9-8.4	<2	High----------	0.20		
	44-52	28-40	0.2-0.6	0.14-0.16	7.9-8.4	<2	Moderate------	0.15		
	52-60	15-25	0.2-0.6	0.05-0.06	7.9-8.4	<2	Low-----------	0.10		
166-------------- Damluis Variant	0-6	27-40	0.2-0.6	0.16-0.18	7.9-8.4	<2	Moderate------	0.28	2	1-3
	6-32	40-55	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.28		
	32-60	---	---	---	---	---	--------------	----		
	60-73	0-8	>20	0.02-0.04	7.9-8.4	<2	Low-----------	0.05		
167-------------- Deldota	0-17	40-50	0.06-0.2	0.15-0.16	7.4-8.4	<2	High----------	0.28	5	1-3
	17-24	35-50	0.06-0.2	0.15-0.17	7.4-8.4	<2	High----------	0.28		
	24-68	30-40	0.06-0.2	0.16-0.18	7.4-8.4	<2	Moderate------	0.24		
168-------------- Dosamigos	0-5	35-40	0.06-0.2	0.17-0.20	7.9-8.4	<2	Moderate------	0.28	5	1-2
	5-29	37-50	<0.06	0.12-0.17	7.9-8.4	<8	High----------	0.28		
	29-62	30-45	0.06-0.2	0.09-0.16	7.9-8.4	2-16	Moderate------	0.32		
169-------------- Dosamigos	0-15	40-45	0.06-0.2	0.14-0.16	7.9-8.4	<2	High----------	0.24	5	1-2
	15-27	37-50	<0.06	0.12-0.17	7.9-8.4	<8	High----------	0.28		
	27-60	30-45	0.06-0.2	0.09-0.16	7.9-8.4	2-16	Moderate------	0.32		
170-------------- Dospalos	0-27	35-40	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate------	0.32	5	1-3
	27-37	35-60	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.32		
	37-62	30-60	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.32		
171-------------- Dospalos	0-24	40-60	0.06-0.2	0.13-0.16	7.4-8.4	<2	High----------	0.28	5	1-3
	24-35	35-60	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.32		
	35-62	30-60	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.32		
172-------------- Dospalos	0-32	40-60	0.06-0.2	0.09-0.14	7.4-8.4	4-16	High----------	0.28	5	1-3
	32-41	35-60	0.06-0.2	0.09-0.14	7.9-8.4	4-16	High----------	0.32		
	41-62	30-60	0.06-0.2	0.09-0.14	7.9-8.4	4-16	High----------	0.32		
173*:										
Dospalos---------	0-32	40-60	0.06-0.2	0.09-0.14	7.4-8.4	4-16	High----------	0.28	5	1-3
	32-41	35-60	0.06-0.2	0.09-0.14	7.9-8.4	4-16	High----------	0.32		
	41-62	30-60	0.06-0.2	0.09-0.14	7.9-8.4	4-16	High----------	0.32		
Bolfar-----------	0-26	27-35	0.2-0.6	0.13-0.17	7.4-8.4	<8	Moderate------	0.32	5	1-3
	26-60	18-35	0.2-0.6	0.12-0.16	7.9-8.4	<8	Moderate------	0.37		
174*:										
Dospalos---------	0-24	40-60	0.06-0.2	0.13-0.16	7.4-8.4	<2	High----------	0.28	5	1-3
	24-35	35-60	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.32		
	35-62	30-60	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.32		
Urban land.										
175-------------- Edminster	0-4	10-20	0.6-2.0	0.14-0.16	6.1-7.8	<2	Low-----------	0.43	5	<1
	4-26	25-35	<0.06	0.05-0.08	7.9-9.0	2-8	Moderate------	0.37		
	26-60	10-30	0.6-2.0	0.08-0.15	7.9-9.0	<8	Low-----------	0.32		
176*:										
Edminster--------	0-4	10-20	0.6-2.0	0.14-0.16	6.1-7.8	<2	Low-----------	0.43	5	<1
	4-26	25-35	<0.06	0.05-0.08	7.9-9.0	2-8	Moderate------	0.37		
	26-60	10-30	0.6-2.0	0.08-0.15	7.9-9.0	<8	Low-----------	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
176*:										
Kesterson-------	0-3	10-20	0.6-2.0	0.10-0.13	6.1-8.4	<2	Low-----------	0.43	5	<1
	3-26	25-35	<0.06	0.05-0.08	8.5-9.0	2-8	Moderate------	0.37		
	26-46	20-30	0.06-0.2	0.05-0.08	8.5-9.0	2-8	Low-----------	0.37		
	46-60	15-30	0.2-0.6	0.10-0.15	8.5-9.0	<8	Low-----------	0.32		
177-------------- Edminster Variant	0-16	0-5	6.0-20	0.05-0.08	6.6-7.3	<2	Low-----------	0.20	5	<1
	16-25	0-10	6.0-20	0.05-0.08	6.6-7.3	<2	Low-----------	0.20		
	25-60	15-25	0.2-0.6	0.14-0.16	7.9-8.4	<2	Low-----------	0.37		
178-------------- Elnido	0-18	5-18	2.0-6.0	0.09-0.12	7.4-8.4	<2	Low-----------	0.32	5	1-3
	18-60	5-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-----------	0.37		
179-------------- Elnido	0-8	5-18	2.0-6.0	0.09-0.12	6.6-7.8	<2	Low-----------	0.32	5	1-3
	8-32	5-18	2.0-6.0	0.09-0.13	6.6-8.4	<2	Low-----------	0.37		
	32-60	0-10	2.0-6.0	0.07-0.09	6.6-8.4	<2	Low-----------	0.32		
180-------------- Elnido	0-17	27-30	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate------	0.28	5	1-3
	17-44	5-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-----------	0.37		
	44-60	5-18	2.0-6.0	0.07-0.12	7.4-9.0	<2	Low-----------	0.32		
181-------------- Escano	0-17	27-35	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate------	0.32	5	1-3
	17-29	20-35	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate------	0.32		
	29-51	27-35	0.2-0.6	0.13-0.16	7.9-8.4	<4	Low-----------	0.32		
	51-60	20-35	0.2-0.6	0.13-0.18	7.9-8.4	<2	Moderate------	0.37		
182-------------- Fifield	0-5	5-15	2.0-6.0	0.09-0.12	5.6-7.3	<2	Low-----------	0.24	2	1-5
	5-15	18-25	0.6-2.0	0.06-0.11	5.1-6.5	<2	Low-----------	0.10		
	15-30	18-25	0.6-2.0	0.02-0.06	5.1-6.5	<2	Low-----------	0.05		
	30	---	---	---	---	---	--------------	-----		
183*:										
Fifield---------	0-5	5-15	2.0-6.0	0.09-0.12	5.6-7.3	<2	Low-----------	0.24	2	1-5
	5-15	18-25	0.6-2.0	0.06-0.11	5.1-6.5	<2	Low-----------	0.10		
	15-30	18-25	0.6-2.0	0.02-0.06	5.1-6.5	<2	Low-----------	0.05		
	30	---	---	---	---	---	--------------	-----		
Gonzaga---------	0-16	15-27	0.6-2.0	0.13-0.16	6.1-7.3	<2	Low-----------	0.32	2	1-5
	16-22	15-27	0.2-0.6	0.11-0.14	6.6-7.3	<2	Moderate------	0.20		
	22-39	35-55	<0.06	0.06-0.08	6.6-7.8	<2	High----------	0.15		
	39	---	---	---	---	---	--------------	-----		
184*:										
Fifield---------	0-5	5-15	2.0-6.0	0.09-0.12	5.6-7.3	<2	Low-----------	0.24	2	1-5
	5-15	18-25	0.6-2.0	0.06-0.11	5.1-6.5	<2	Low-----------	0.10		
	15-30	18-25	0.6-2.0	0.02-0.06	5.1-6.5	<2	Low-----------	0.05		
	30	---	---	---	---	---	--------------	-----		
Honker----------	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low-----------	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate------	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High----------	0.28		
	38	---	---	---	---	---	--------------	-----		
Gonzaga---------	0-16	15-27	0.6-2.0	0.13-0.16	6.1-7.3	<2	Low-----------	0.32	2	1-5
	16-22	15-27	0.2-0.6	0.11-0.14	6.6-7.3	<2	Moderate------	0.20		
	22-39	35-55	<0.06	0.06-0.08	6.6-7.8	<2	High----------	0.15		
	39	---	---	---	---	---	--------------	-----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
185*:										
Fifield----------	0-5	5-15	2.0-6.0	0.09-0.12	5.6-7.3	<2	Low-----------	0.24	2	1-5
	5-15	18-25	0.6-2.0	0.06-0.11	5.1-6.5	<2	Low-----------	0.10		
	15-30	18-25	0.6-2.0	0.02-0.06	5.1-6.5	<2	Low-----------	0.05		
	30	---	---	---	---	---	--------------	----		
Millsholm--------	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	19	---	---	---	---	---	--------------	----		
186. Fluvaquents										
187-------------- Franciscan	0-10	10-20	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low-----------	0.24	2	2-4
	10-26	20-35	0.2-0.6	0.12-0.16	6.1-7.3	<2	Moderate------	0.32		
	26-38	20-35	0.2-0.6	0.10-0.14	6.1-7.3	<2	Moderate------	0.20		
	38	---	---	---	---	---	--------------	----		
188*:										
Franciscan-------	0-10	10-20	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low-----------	0.24	2	2-4
	10-26	20-35	0.2-0.6	0.12-0.16	6.1-7.3	<2	Moderate------	0.32		
	26-38	20-35	0.2-0.6	0.10-0.14	6.1-7.3	<2	Moderate------	0.20		
	38	---	---	---	---	---	--------------	----		
Quinto-----------	0-6	10-20	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low-----------	0.20	1	1-3
	6-17	20-35	0.2-0.6	0.10-0.13	6.1-7.8	<2	Moderate------	0.20		
	17	---	---	---	---	---	--------------	----		
Honker-----------	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low-----------	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate------	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High----------	0.28		
	38	---	---	---	---	---	--------------	----		
189*:										
Franciscan-------	0-10	10-20	2.0-6.0	0.09-0.12	6.1-7.3	<2	Low-----------	0.24	2	2-4
	10-26	20-35	0.2-0.6	0.12-0.16	6.1-7.3	<2	Moderate------	0.32		
	26-38	20-35	0.2-0.6	0.10-0.14	6.1-7.3	<2	Moderate------	0.20		
	38	---	---	---	---	---	--------------	----		
Rock outcrop.										
190*, 191*:										
Gonzaga----------	0-16	15-27	0.6-2.0	0.13-0.16	6.1-7.3	<2	Low-----------	0.32	2	1-5
	16-22	15-27	0.2-0.6	0.11-0.14	6.6-7.3	<2	Moderate------	0.20		
	22-39	35-55	<0.06	0.06-0.08	6.6-7.8	<2	High----------	0.15		
	39	---	---	---	---	---	--------------	----		
Honker-----------	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low-----------	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate------	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High----------	0.28		
	38	---	---	---	---	---	--------------	----		
192-------------- Henmel	0-15	27-35	0.2-0.6	0.17-0.19	7.9-8.4	<2	Moderate------	0.32	5	1-3
	15-37	35-45	0.06-0.2	0.14-0.16	7.9-8.4	<2	High----------	0.32		
	37-44	35-40	0.06-0.2	0.13-0.16	7.9-8.4	<2	High----------	0.24		
	44-66	15-25	2.0-6.0	0.10-0.18	7.9-9.0	<2	Moderate------	0.28		
193-------------- Herito	0-12	18-25	0.6-2.0	0.15-0.17	6.1-7.3	<2	Low-----------	0.37	5	.5-1
	12-43	35-40	0.06-0.2	0.15-0.18	6.6-8.4	<2	High----------	0.32		
	43-60	30-35	0.2-0.6	0.17-0.19	7.4-8.4	<2	Moderate------	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
194, 195 Honker	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High	0.28		
	38	---	---	---	---	---	---	---		
196*:										
Honker	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High	0.28		
	38	---	---	---	---	---	---	---		
Millsholm	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low	0.43	1	1-3
	19	---	---	---	---	---	---	---		
Rock outcrop.										
197*:										
Honker	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High	0.28		
	38	---	---	---	---	---	---	---		
Quinto	0-6	10-20	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low	0.20	1	1-3
	6-17	20-35	0.2-0.6	0.10-0.13	6.1-7.8	<2	Moderate	0.20		
	17	---	---	---	---	---	---	---		
198 Kesterson	0-3	10-20	0.6-2.0	0.10-0.13	6.1-8.4	<2	Low	0.43	5	<1
	3-26	25-35	<0.06	0.05-0.08	8.5-9.0	2-8	Moderate	0.37		
	26-46	20-30	0.06-0.2	0.05-0.08	8.5-9.0	2-8	Low	0.37		
	46-60	15-30	0.2-0.6	0.10-0.15	8.5-9.0	<8	Low	0.32		
199 Kesterson	0-6	10-20	0.6-2.0	0.10-0.13	6.1-8.4	<2	Low	0.43	5	<1
	6-43	25-35	<0.06	0.05-0.08	8.5-9.0	2-8	Moderate	0.37		
	43-60	15-30	0.2-0.6	0.10-0.15	8.5-9.0	<8	Low	0.32		
200 Kesterson	0-6	10-20	0.6-2.0	0.14-0.16	6.1-8.4	<2	Low	0.43	5	<1
	6-43	25-35	<0.06	0.05-0.08	8.5-9.0	2-8	Moderate	0.37		
	43-60	15-30	0.2-0.6	0.10-0.15	8.5-9.0	<8	Low	0.32		
201*:										
Kesterson	0-3	10-20	0.6-2.0	0.10-0.13	6.1-8.4	<2	Low	0.43	5	<1
	3-26	25-35	<0.06	0.05-0.08	8.5-9.0	2-8	Moderate	0.37		
	26-46	20-30	0.06-0.2	0.05-0.08	8.5-9.0	2-8	Low	0.37		
	46-60	15-30	0.2-0.6	0.10-0.15	8.5-9.0	<8	Low	0.32		
Edminster	0-4	10-20	0.6-2.0	0.14-0.16	6.1-7.8	<2	Low	0.43	5	<1
	4-26	25-35	<0.06	0.05-0.08	7.9-9.0	2-8	Moderate	0.37		
	26-60	10-30	0.6-2.0	0.08-0.15	7.9-9.0	<8	Low	0.32		
202*, 203*:										
Laveaga	0-18	20-35	0.2-0.6	0.14-0.16	5.6-7.3	<2	Moderate	0.24	3	1-3
	18-27	35-45	0.06-0.2	0.14-0.16	5.6-7.3	<2	High	0.32		
	27-48	15-25	0.6-2.0	0.12-0.15	5.6-7.3	<2	Moderate	0.37		
	48-60	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
202*, 203*:										
Lecrag----------	0-26	40-55	0.06-0.2	0.14-0.16	5.6-7.3	<2	High----------	0.24	3	1-3
	26-35	35-45	0.06-0.2	0.14-0.16	5.6-7.3	<2	High----------	0.24		
	35-46	20-35	0.2-0.6	0.14-0.16	5.6-7.3	<2	Moderate------	0.24		
	46-60	---	---	---	---	---	--------------	----		
204*:										
Laveaga, very stony----------	0-16	27-35	0.2-0.6	0.14-0.17	5.6-7.3	<2	Moderate------	0.20	3	1-3
	16-30	35-45	0.06-0.2	0.14-0.16	5.6-7.3	<2	High----------	0.32		
	30-42	15-25	0.6-2.0	0.12-0.15	5.6-7.3	<2	Moderate------	0.37		
	42	---	---	---	---	---	--------------	----		
Laveaga---------	0-16	27-35	0.2-0.6	0.17-0.19	5.6-7.3	<2	Moderate------	0.28	3	1-3
	16-30	35-45	0.06-0.2	0.14-0.16	5.6-7.3	<2	High----------	0.32		
	30-42	15-25	0.6-2.0	0.12-0.15	5.6-7.3	<2	Moderate------	0.37		
	42	---	---	---	---	---	--------------	----		
205*:										
Laveaga---------	0-18	20-35	0.2-0.6	0.14-0.16	5.6-7.3	<2	Moderate------	0.24	3	1-3
	18-27	35-45	0.06-0.2	0.14-0.16	5.6-7.3	<2	High----------	0.32		
	27-48	15-25	0.6-2.0	0.12-0.15	5.6-7.3	<2	Moderate------	0.37		
	48-60	---	---	---	---	---	--------------	----		
Hytop-----------	0-5	15-20	2.0-6.0	0.11-0.12	6.6-7.8	<2	Low-----------	0.28	2	1-3
	5-10	20-25	0.2-0.6	0.16-0.17	6.6-7.8	<2	Moderate------	0.28		
	10-26	35-50	<0.06	0.06-0.08	6.6-7.8	<2	High----------	0.32		
	26	---	---	---	---	---	--------------	----		
206-------------- Los Banos	0-10	27-40	0.2-0.6	0.15-0.19	7.4-8.4	<2	Moderate------	0.32	5	.5-2
	10-42	35-55	0.06-0.2	0.13-0.17	7.4-8.4	<2	High----------	0.32		
	42-60	25-40	0.06-0.2	0.09-0.15	7.9-8.4	<2	Moderate------	0.15		
207, 208--------- Los Banos	0-9	27-40	0.2-0.6	0.15-0.19	7.4-8.4	<2	Moderate------	0.32	5	.5-2
	9-55	35-55	0.06-0.2	0.13-0.17	7.4-8.4	<2	High----------	0.32		
	55-63	25-40	0.06-0.2	0.09-0.15	7.9-8.4	<2	Moderate------	0.15		
209*:										
Los Banos-------	0-9	27-40	0.2-0.6	0.15-0.19	7.4-8.4	<2	Moderate------	0.32	5	.5-2
	9-55	35-55	0.06-0.2	0.13-0.17	7.4-8.4	<2	High----------	0.32		
	55-63	25-40	0.06-0.2	0.09-0.15	7.9-8.4	<2	Moderate------	0.15		
Pleito----------	0-18	20-35	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate------	0.32	5	1-2
	18-24	20-35	0.06-0.2	0.14-0.18	7.9-8.4	<2	Moderate------	0.32		
	24-60	20-35	0.02-0.6	0.10-0.14	7.9-8.4	<2	Moderate------	0.32		
210-------------- Los Banos Variant	0-16	20-30	0.2-0.6	0.10-0.15	6.6-7.3	<2	Moderate------	0.20	5	1-2
	16-30	25-40	0.2-0.6	0.10-0.16	6.6-7.8	<2	Moderate------	0.20		
	30-37	20-30	0.2-0.6	0.10-0.15	6.6-7.8	<2	Moderate------	0.20		
	37-65	10-20	2.0-6.0	0.03-0.05	7.4-7.8	<2	Low-----------	0.10		
211-------------- Marcuse	0-4	40-60	0.06-0.2	0.09-0.12	7.9-9.0	8-16	High----------	0.32	5	<1
	4-60	40-60	0.06-0.2	0.09-0.12	7.9-9.0	8-16	High----------	0.32		
212-------------- Marcuse	0-11	40-60	0.06-0.2	0.09-0.12	7.9-9.0	8-16	High----------	0.32	5	<1
	11-49	40-60	0.06-0.2	0.09-0.12	7.9-9.0	8-16	High----------	0.32		
	49-60	35-60	0.06-0.2	0.06-0.09	7.9-9.0	>16	High----------	0.32		
213, 214, 215---- Millsholm	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	19	---	---	---	---	---	--------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
216*:										
Millsholm-------	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	19	---	---	---	---	---	--------------	----		
Fifield---------	0-5	5-15	2.0-6.0	0.09-0.12	5.6-7.3	<2	Low-----------	0.24	1	1-5
	5-15	18-25	0.6-2.0	0.06-0.11	5.1-6.5	<2	Low-----------	0.10		
	15-30	18-25	0.6-2.0	0.02-0.06	5.1-6.5	<2	Low-----------	0.05		
	30	---	---	---	---	---	--------------	----		
217*:										
Millsholm-------	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	19	---	---	---	---	---	--------------	----		
Honker----------	0-7	10-20	2.0-6.0	0.10-0.12	6.1-7.3	<2	Low-----------	0.28	2	1-3
	7-14	20-35	0.2-0.6	0.15-0.18	6.1-7.3	<2	Moderate------	0.32		
	14-38	35-55	<0.06	0.06-0.08	6.1-7.8	<2	High----------	0.28		
	38	---	---	---	---	---	--------------	----		
Rock outcrop.										
218*:										
Millsholm-------	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	19	---	---	---	---	---	--------------	----		
Rock outcrop.										
219*:										
Millsholm-------	0-11	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	11	---	---	---	---	---	--------------	----		
Rock outcrop.										
220. Mollic Xerofluvents										
221, 222, 223---- Oneil	0-21	20-27	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low-----------	0.43	2	1-3
	21-29	20-35	0.2-0.6	0.14-0.20	7.9-8.4	<2	Moderate------	0.49		
	29	---	---	---	---	---	--------------	----		
224-------------- Oquin	0-20	12-18	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low-----------	0.32	2	1-3
	20-39	12-18	2.0-6.0	0.11-0.14	7.4-8.4	<2	Low-----------	0.37		
	39	---	---	---	---	---	--------------	----		
225-------------- Oquin	0-24	12-18	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low-----------	0.32	2	1-3
	24-31	12-18	2.0-6.0	0.11-0.14	7.4-8.4	<2	Low-----------	0.37		
	31	---	---	---	---	---	--------------	----		
226-------------- Orognen	0-16	10-20	2.0-6.0	0.10-0.13	6.1-7.8	<2	Low-----------	0.37	5	<1
	16-19	15-25	0.2-2.0	0.14-0.18	6.6-7.8	<2	Moderate------	0.28		
	19-34	35-60	<0.06	0.12-0.16	6.6-8.4	<2	High----------	0.24		
	34-62	30-40	0.2-0.6	0.09-0.15	7.4-8.4	<2	Moderate------	0.20		
227*:										
Orognen---------	0-3	10-20	2.0-6.0	0.10-0.13	6.1-7.8	<2	Low-----------	0.37	5	<1
	3-13	15-25	0.2-2.0	0.14-0.18	6.6-7.8	<2	Moderate------	0.28		
	13-39	35-60	<0.06	0.12-0.16	6.6-8.4	<2	High----------	0.24		
	39-60	30-40	0.2-0.6	0.09-0.15	7.4-8.4	<2	Moderate------	0.20		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
227*:										
Quiensabe-------	0-14	25-35	0.2-0.6	0.13-0.17	6.6-7.3	<2	Moderate------	0.28	2	1-3
	14-22	35-45	0.06-0.2	0.11-0.14	6.6-7.8	<2	High----------	0.20		
	22-27	30-40	0.06-0.2	0.08-0.14	6.6-7.8	<2	High----------	0.15		
	27	---	---	---	---	---	--------------	----		
228-------------- Palazzo	0-14	10-18	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-----------	0.28	5	1-3
	14-26	5-18	2.0-6.0	0.08-0.12	7.4-8.4	<2	Low-----------	0.24		
	26-60	20-35	0.2-0.6	0.14-0.17	7.4-8.4	2-4	Moderate------	0.37		
229, 230--------- Paver	0-16	27-35	0.2-0.6	0.17-0.19	6.6-7.8	<2	Moderate------	0.37	5	<1
	16-76	23-35	0.2-0.6	0.16-0.19	7.9-8.4	2-4	Moderate------	0.43		
231, 232--------- Peckham	0-13	10-20	0.6-2.0	0.12-0.15	5.6-7.3	<2	Low-----------	0.24	2	.5-2
	13-20	18-28	0.2-0.6	0.07-0.09	5.6-7.3	<2	Moderate------	0.10		
	20-24	40-60	0.06-0.2	0.04-0.05	6.1-7.3	<2	Moderate------	0.05		
	24	---	---	---	---	---	--------------	----		
233*:										
Peckham---------	0-13	10-20	0.6-2.0	0.12-0.15	5.6-7.3	<2	Low-----------	0.24	2	.5-2
	13-20	18-28	0.2-0.6	0.07-0.09	5.6-7.3	<2	Moderate------	0.10		
	20-24	40-60	0.06-0.2	0.04-0.05	6.1-7.3	<2	Moderate------	0.05		
	24	---	---	---	---	---	--------------	----		
Cole Variant----	0-6	27-35	0.2-0.6	0.18-0.21	6.6-7.3	<2	Moderate------	0.28	5	2-5
	6-32	35-45	0.06-0.2	0.14-0.16	6.6-7.8	<2	High----------	0.28		
	32-64	20-40	<0.06	0.14-0.16	6.6-7.8	<2	Moderate------	0.32		
234-------------- Pedcat	0-5	18-27	0.6-2.0	0.09-0.14	6.1-7.3	8-16	Low-----------	0.43	5	<1
	5-23	40-50	<0.06	0.09-0.13	7.9-8.4	>8	High----------	0.32		
	23-29	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
	29-60	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
235-------------- Pedcat	0-4	18-27	0.6-2.0	0.09-0.14	6.1-7.3	8-16	Low-----------	0.43	5	<1
	4-22	40-50	<0.06	0.09-0.13	7.9-8.4	>8	High----------	0.32		
	22-60	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
236-------------- Pedcat	0-5	27-38	0.2-0.6	0.10-0.16	6.6-7.8	8-16	Moderate------	0.37	5	<1
	5-23	40-50	<0.06	0.09-0.13	7.9-8.4	>8	High----------	0.32		
	23-29	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
	29-60	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
237-------------- Pedcat	0-18	40-50	<0.06	0.09-0.13	7.9-8.4	8-16	High----------	0.32	5	<1
	18-23	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
	23-60	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
238*. Pits										
239-------------- Pleito	0-18	27-35	0.6-2.0	0.12-0.16	7.4-8.4	<2	Moderate------	0.20	5	1-2
	18-24	20-35	0.02-0.6	0.14-0.18	7.9-8.4	<2	Moderate------	0.32		
	24-60	20-35	0.02-0.6	0.11-0.15	7.9-8.4	<2	Moderate------	0.20		
240-------------- Pleito	0-11	27-35	0.6-2.0	0.12-0.16	7.4-8.4	<2	Moderate------	0.20	5	1-2
	11-40	20-35	0.06-0.2	0.14-0.18	7.9-8.4	<2	Moderate------	0.32		
	40-60	27-35	0.06-0.2	0.03-0.08	7.9-8.4	<2	Low-----------	0.10		
241*:										
Quinto----------	0-6	10-20	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low-----------	0.20	1	1-3
	6-17	20-35	0.2-0.6	0.10-0.13	6.1-7.8	<2	Moderate------	0.20		
	17	---	---	---	---	---	--------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
241*:										
Illito----------	0-5	20-27	0.6-2.0	0.08-0.10	6.1-7.3	<2	Low-----------	0.15	1	1-2
	5-8	35-45	<0.06	0.08-0.10	6.1-7.3	<2	High----------	0.10		
	8	---	---	---	---	---	--------------	----		
Rock outcrop.										
242*:										
Quinto----------	0-6	10-20	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low-----------	0.20	1	1-3
	6-17	20-35	0.2-0.6	0.10-0.13	6.1-7.8	<2	Moderate------	0.20		
	17	---	---	---	---	---	--------------	----		
Millsholm-------	0-19	20-27	0.6-2.0	0.14-0.17	5.6-7.3	<2	Low-----------	0.43	1	1-3
	19	---	---	---	---	---	--------------	----		
Rock outcrop.										
243*:										
Quinto----------	0-6	10-20	2.0-6.0	0.09-0.11	6.1-7.3	<2	Low-----------	0.20	1	1-3
	6-17	20-35	0.2-0.6	0.10-0.13	6.1-7.8	<2	Moderate------	0.20		
	17	---	---	---	---	---	--------------	----		
Rock outcrop.										
244*:										
Rock outcrop.										
Ararat----------	0-7	16-24	0.6-2.0	0.11-0.14	5.6-6.5	<2	Low-----------	0.15	3	1-4
	7-24	18-26	0.2-0.6	0.08-0.11	6.1-6.5	<2	Low-----------	0.10		
	24-45	18-26	0.2-0.6	0.05-0.06	6.1-7.3	<2	Low-----------	0.10		
	45	---	---	---	---	---	--------------	----		
Illito----------	0-5	20-27	0.6-2.0	0.08-0.10	6.1-7.3	<2	Low-----------	0.15	1	1-2
	5-8	35-45	<0.06	0.08-0.10	6.1-7.3	<2	High----------	0.10		
	8	---	---	---	---	---	--------------	----		
245*:										
Rock outcrop.										
Wisflat---------	0-3	7-18	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low-----------	0.37	1	<.1
	3-11	5-18	2.0-6.0	0.09-0.15	7.9-8.4	<2	Low-----------	0.43		
	11-13	---	---	---	---	---	--------------	----		
	13	---	---	---	---	---	--------------	----		
246-------------- San Emigdio	0-17	10-18	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low-----------	0.32	5	.5-1
	17-60	10-18	2.0-6.0	0.10-0.17	7.9-8.4	<2	Low-----------	0.32		
247-------------- San Emigdio	0-14	10-18	2.0-6.0	0.15-0.17	7.9-8.4	<2	Low-----------	0.32	5	.5-1
	14-60	10-18	2.0-6.0	0.10-0.17	7.9-8.4	<2	Low-----------	0.32		
248-------------- Santanela	0-6	10-20	0.6-2.0	0.13-0.16	6.6-8.4	<2	Low-----------	0.43	5	<1
	6-19	20-35	0.06-0.2	0.06-0.08	7.9-9.0	4-8	Moderate------	0.37		
	19-61	15-30	0.06-0.2	0.11-0.15	7.9-9.0	2-8	Moderate------	0.32		
249-------------- San Timoteo	0-16	8-18	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low-----------	0.37	2	<1
	16-32	8-18	2.0-6.0	0.11-0.15	7.9-8.4	<2	Low-----------	0.43		
	32	---	---	---	---	---	--------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
250*, 251*:										
San Timoteo-----	0-16	8-18	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low-----------	0.37	2	<1
	16-32	8-18	2.0-6.0	0.11-0.15	7.9-8.4	<2	Low-----------	0.43		
	32	---	---	---	---	---	-------------	----		
Wisflat---------	0-6	7-18	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low-----------	0.37	1	<.1
	6-14	5-18	2.0-6.0	0.09-0.15	7.9-8.4	<2	Low-----------	0.43		
	14-16	---	---	---	---	---	-------------	----		
	16	---	---	---	---	---	-------------	----		
252*:										
Sehorn----------	0-7	40-50	0.06-0.2	0.14-0.16	5.6-7.3	<2	High----------	0.28	2	1-3
	7-26	40-50	0.06-0.2	0.14-0.16	6.6-8.4	<2	High----------	0.28		
	26	---	---	---	---	---	-------------	----		
Contra Costa----	0-19	20-27	0.6-2.0	0.14-0.16	5.6-7.3	<2	Moderate------	0.28	2	.5-1
	19-32	35-45	0.06-0.2	0.15-0.17	5.6-7.3	<2	High----------	0.28		
	32-39	35-45	0.06-0.2	0.11-0.15	5.6-7.3	<2	High----------	0.20		
	39	---	---	---	---	---	-------------	----		
253-------------- Stanislaus	0-19	35-40	0.06-0.2	0.17-0.20	7.4-8.4	<2	High----------	0.28	5	1-2
	19-39	38-45	0.06-0.2	0.15-0.16	7.4-8.4	<2	High----------	0.24		
	39-65	25-40	0.2-0.6	0.15-0.2	7.4-8.4	<2	Moderate------	0.37		
254-------------- Stanislaus	0-16	35-40	0.06-0.2	0.17-0.2	7.4-8.4	<2	High----------	0.28	5	1-2
	16-50	38-45	0.06-0.2	0.15-0.16	7.4-8.4	<2	High----------	0.24		
	50-60	25-40	0.06-0.2	0.15-0.2	7.4-8.4	<2	Moderate------	0.37		
255*:										
Stanislaus------	0-19	35-40	0.06-0.2	0.17-0.20	7.4-8.4	<2	High----------	0.28	5	1-2
	19-39	38-45	0.06-0.2	0.15-0.16	7.4-8.4	<2	High----------	0.24		
	39-65	25-40	0.2-0.6	0.15-0.2	7.4-8.4	<2	Moderate------	0.37		
Dosamigos-------	0-15	40-45	0.06-0.2	0.14-0.16	7.9-8.4	<2	High----------	0.24	5	1-2
	15-27	37-50	<0.06	0.12-0.17	7.9-8.4	<8	High----------	0.28		
	27-60	30-45	0.06-0.2	0.09-0.16	7.9-8.4	2-16	Moderate------	0.32		
Urban land.										
256-------------- Triangle	0-34	40-60	<0.06	0.12-0.16	7.9-9.0	<8	High----------	0.37	4	<1
	34-60	35-60	<0.06	0.06-0.10	7.9-9.0	8-16	High----------	0.37		
257-------------- Triangle	0-30	40-60	<0.06	0.12-0.16	7.9-9.0	<8	High----------	0.37	4	<1
	30-60	22-45	<0.06	0.02-0.05	>7.8	>16	High----------	0.43		
258-------------- Trulae	0-15	40-60	0.06-0.2	0.12-0.15	7.9-8.4	4-8	High----------	0.32	5	1-2
	15-45	60-65	<0.06	0.12-0.14	7.9-8.4	4-8	High----------	0.24		
	45-63	30-40	0.2-0.6	0.13-0.16	7.9-8.4	4-8	Moderate------	0.28		
259*:										
Tunehill--------	0-7	15-25	0.6-2.0	0.15-0.17	6.6-8.4	<2	Low-----------	0.37	1	1-4
	7-11	18-27	0.6-2.0	0.14-0.17	7.4-8.4	<2	Low-----------	0.43		
	11	---	---	---	---	---	-------------	----		
Quiensabe-------	0-5	28-35	0.2-0.6	0.17-0.19	6.6-7.3	<2	Moderate------	0.28	2	1-3
	5-34	35-45	0.06-0.2	0.11-0.14	6.6-7.8	<2	High----------	0.20		
	34	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
260-------------- Turlock	0-4	10-20	0.6-2.0	0.10-0.13	6.6-8.4	<2	Low-----------	0.43	5	1-4
	4-36	20-35	<0.06	0.05-0.08	7.4-9.0	>4	Moderate------	0.37		
	36-55	25-35	0.06-0.2	0.05-0.08	7.9-9.0	>16	Moderate------	0.37		
	55-60	25-35	0.06-0.2	0.06-0.10	7.9-9.0	>8	Moderate------	0.32		
261-------------- Turlock	0-3	10-20	0.6-2.0	0.14-0.16	6.6-8.4	<2	Low-----------	0.43	5	1-4
	3-35	20-35	<0.06	0.05-0.08	7.4-9.0	>4	Moderate------	0.37		
	35-54	25-35	0.06-0.2	0.05-0.08	7.9-9.0	>16	Moderate------	0.37		
	54-60	25-35	0.06-0.2	0.06-0.10	7.9-9.0	>8	Moderate------	0.32		
262-------------- Turmound	0-13	7-18	2.0-6.0	0.06-0.10	7.9-9.0	8-16	Low-----------	0.37	5	<1
	13-38	20-35	0.06-0.2	0.06-0.08	8.5-9.0	8-16	Moderate------	0.37		
	38-60	25-45	0.06-0.2	0.06-0.10	8.5-9.0	8-16	High----------	0.32		
263-------------- Vernalis	0-7	18-27	0.6-2.0	0.14-0.17	7.4-8.4	<2	Low-----------	0.37	5	1-2
	7-28	20-30	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate------	0.37		
	28-60	10-30	0.2-0.6	0.11-0.18	7.9-8.4	<2	Moderate------	0.32		
264*:										
Vernalis--------	0-7	18-27	0.6-2.0	0.14-0.17	7.4-7.8	<2	Low-----------	0.37	5	1-2
	7-28	20-30	0.2-0.6	0.14-0.18	7.9-8.4	<2	Moderate------	0.37		
	28-60	10-30	0.2-0.6	0.11-0.18	7.9-8.4	<2	Moderate------	0.32		
Pedcat----------	0-4	27-38	0.2-0.6	0.10-0.16	6.6-7.8	8-16	Moderate------	0.37	5	<1
	4-22	40-50	<0.06	0.09-0.13	7.9-8.4	>8	High----------	0.32		
	22-60	30-45	0.06-0.2	0.09-0.12	7.9-9.0	>8	High----------	0.32		
265-------------- Volta	0-1	27-35	0.2-0.6	0.15-0.17	7.4-9.0	<2	Moderate------	0.43	3	<1
	1-26	35-50	<0.06	0.11-0.15	7.9-9.0	4-8	High----------	0.32		
	26-46	30-45	0.06-0.2	0.11-0.15	7.9-9.0	4-8	High----------	0.37		
	46-60	---	---	---	---	---	--------------	----		
266-------------- Volta	0-6	35-40	0.2-0.6	0.15-0.17	7.4-9.0	<2	High----------	0.43	3	<1
	6-33	35-50	<0.06	0.11-0.15	7.9-9.0	2-8	High----------	0.32		
	33-46	30-45	0.06-0.2	0.11-0.15	7.9-9.0	2-8	High----------	0.37		
	46-84	---	---	---	---	---	--------------	----		
267-------------- Wekoda	0-11	50-60	<0.06	0.13-0.15	7.9-8.4	<4	High----------	0.24	5	1-3
	11-62	45-60	<0.06	0.12-0.14	7.9-8.4	4-8	High----------	0.24		
268*, 269*:										
Wisflat---------	0-3	7-18	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low-----------	0.37	1	<.1
	3-11	5-18	2.0-6.0	0.09-0.15	7.9-8.4	<2	Low-----------	0.43		
	11-13	---	---	---	---	---	--------------	----		
	13	---	---	---	---	---	--------------	----		
Arburua---------	0-10	18-27	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low-----------	0.37	2	<1
	10-32	18-30	0.6-2.0	0.12-0.18	7.9-8.4	<2	Moderate------	0.37		
	32	---	---	---	---	---	--------------	----		
270*, 271*, 272*:										
Wisflat---------	0-6	7-18	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low-----------	0.37	1	<.1
	6-14	5-18	2.0-6.0	0.09-0.15	7.9-8.4	<2	Low-----------	0.43		
	14-16	---	---	---	---	---	--------------	----		
	16	---	---	---	---	---	--------------	----		
Rock outcrop.										
Arburua---------	0-10	18-27	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low-----------	0.37	2	<1
	10-32	18-30	0.6-2.0	0.12-0.18	7.9-8.4	<2	Moderate------	0.37		
	32	---	---	---	---	---	--------------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
273*:										
Wisflat----------	0-6	7-18	2.0-6.0	0.10-0.13	7.9-8.4	<2	Low------------	0.37	1	<.1
	6-14	5-18	2.0-6.0	0.09-0.15	7.9-8.4	<2	Low------------	0.43		
	14-16	---	---	---	---	---	--------------	----		
	16	---	---	---	---	---	--------------	----		
Rock outcrop.										
Oneil-----------	0-21	20-27	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low------------	0.43	2	1-3
	21-29	20-35	0.2-0.6	0.14-0.20	7.9-8.4	<2	Moderate------	0.49		
	29	---	---	---	---	---	--------------	----		
274-------------- Woo	0-16	18-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Low------------	0.37	5	1-2
	16-67	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
275-------------- Woo	0-19	18-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Low------------	0.37	5	1-2
	19-38	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
	38-62	5-15	2.0-6.0	0.06-0.08	7.4-8.4	<2	Low------------	0.20		
276-------------- Woo	0-16	25-35	0.2-0.6	0.14-0.17	6.6-8.4	<2	Moderate------	0.28	5	1-2
	16-42	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
	42-60	5-15	2.0-6.0	0.06-0.08	7.4-8.4	<2	Low------------	0.20		
277, 278--------- Woo	0-15	27-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate------	0.32	5	1-2
	15-60	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
279-------------- Woo	0-19	27-35	0.2-0.6	0.17-0.19	6.6-7.8	<2	Moderate------	0.32	5	1-2
	19-48	18-35	0.2-0.6	0.14-0.19	7.9-8.4	<2	Moderate------	0.32		
	48-62	35-45	0.06-0.2	0.14-0.17	7.9-8.4	<4	High----------	0.32		
280-------------- Woo	0-17	40-45	0.06-0.2	0.14-0.16	6.6-8.4	<2	High----------	0.28	5	1-2
	17-60	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
281*:										
Woo--------------	0-16	25-35	0.2-0.6	0.14-0.17	6.6-8.4	<2	Moderate------	0.28	5	1-2
	16-42	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
	42-60	5-15	2.0-6.0	0.06-0.08	7.4-8.4	<2	Low------------	0.20		
Anela------------	0-16	18-27	0.6-2.0	0.10-0.14	6.1-7.3	<2	Low------------	0.20	5	1-3
	16-42	27-35	0.6-2.0	0.08-0.12	6.6-8.4	<2	Low------------	0.15		
	42-60	5-30	0.6-2.0	0.04-0.07	7.4-8.4	<2	Low------------	0.10		
Urban land.										
282*:										
Woo loam---------	0-16	18-27	0.6-2.0	0.14-0.17	6.6-8.4	<2	Low------------	0.37	5	1-2
	16-67	18-35	0.2-0.6	0.14-0.19	7.4-8.4	<2	Moderate------	0.32		
Woo clay loam---	0-19	27-35	0.2-0.6	0.17-0.19	6.6-7.8	<2	Moderate------	0.32	5	1-2
	19-48	18-35	0.2-0.6	0.14-0.19	7.9-8.4	<2	Moderate------	0.32		
	48-62	35-45	0.06-0.2	0.14-0.17	7.9-8.4	<4	High----------	0.32		
Urban land.										
283, 284. Xerofluvents										
285-------------- Yokut	0-6	12-18	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low------------	0.37	4	<1
	6-16	15-25	0.6-2.0	0.15-0.17	5.6-6.5	<2	Low------------	0.32		
	16-68	20-30	0.2-0.6	0.04-0.05	7.9-8.4	<2	Moderate------	0.10		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm				Pct
286----------------	0-8	18-25	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low------------	0.37	4	<1
Yokut	8-19	15-25	0.6-2.0	0.15-0.17	5.6-6.5	<2	Low------------	0.32		
	19-75	20-30	0.2-0.6	0.04-0.05	7.9-8.4	<2	Moderate------	0.10		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Frequency of flooding	High water table			Bedrock		Cemented pan		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
			Ft			In		In			
101 Agnal	D	None	+1-1.5	Perched	Sep-Apr	>60	---	---	---	High	Moderate.
102*:											
Akad	C	None	>6.0	---	---	20-30	Hard	---	---	Moderate	Low.
Conosta	C	None	>6.0	---	---	20-40	Soft	---	---	High	Low.
103, 104 Alros	C	None	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High	Moderate.
105*:											
Altamont Variant	D	None	>6.0	---	---	40-50	Hard	---	---	High	Low.
Hytop	D	None	>6.0	---	---	20-40	Soft	---	---	High	Low.
106, 107 Anela	B	Rare	>6.0	---	---	>60	---	---	---	High	Low.
108 Anela	B	None	>6.0	---	---	>60	---	---	---	High	Low.
109, 110, 111 Apollo	B	None	>6.0	---	---	40-60	Soft	---	---	High	Low.
112 Ararat	B	None	>6.0	---	---	40-50	Hard	---	---	Moderate	Moderate.
113*:											
Ararat	B	None	>6.0	---	---	40-50	Hard	---	---	Moderate	Moderate.
Gonzaga	C	None	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
114*, 115*:											
Ararat	B	None	>6.0	---	---	40-50	Hard	---	---	Moderate	Moderate.
Peckham	C	None	>6.0	---	---	20-30	Hard	---	---	Moderate	Moderate.
116 Arbuckle Variant	B	None	>6.0	---	---	>60	---	---	---	High	Low.
117, 118, 119, 120 Arburua	C	None	>6.0	---	---	24-40	Hard	---	---	High	Low.
121, 122 Asolt	D	None	>6.0	---	---	40-60	Hard	---	---	High	Low.
123, 124, 125, 126 Ayar	D	None	>6.0	---	---	40-60	Soft	---	---	High	Low.
127*, 128*, 129*:											
Ayar	D	None	>6.0	---	---	40-60	Soft	---	---	High	Low.
Arburua	C	None	>6.0	---	---	24-40	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Frequency of flooding	High water table			Bedrock		Cemented pan		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
			Ft			In		In			
130*:											
Ayar	D	None	>6.0	---	---	40-60	Soft	---	---	High	Low.
Oneil	C	None	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
131 Ballvar	B	None	>6.0	---	---	>60	---	---	---	High	Low.
132*:											
Ballvar	B	None	>6.0	---	---	>60	---	---	---	High	Low.
Pedcat	D	None	1.5-3.0	Perched	Dec-Mar	>60	---	---	---	High	Moderate.
133, 134, 135 Bapos	D	None	>6.0	---	---	>60	---	---	---	High	Low.
136*:											
Bapos	D	None	>6.0	---	---	>60	---	---	---	High	Low.
Arburua	C	None	>6.0	---	---	24-40	Hard	---	---	High	Low.
137 Bisgani	B	None	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High	Low.
138 Bisgani	C	Occasional	3.5-5.0	Perched	Dec-Mar	>60	---	---	---	High	Low.
139 Bolfar	C	None	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High	Low.
140 Bolfar	C	None	3.0-5.0	Perched	Dec-Mar	>60	---	---	---	High	Low.
141, 142 Britto	D	None	1.0-3.0	Perched	Oct-Mar	>60	---	---	---	High	Moderate.
143 Britto	D	None	+1-1.5	Perched	Sep-May	>60	---	---	---	High	Moderate.
144, 145 Capay	D	None	>6.0	---	---	>60	---	---	---	High	Moderate.
146, 147 Carranza	B	None	>6.0	---	---	>60	---	---	---	Moderate	Low.
148*:											
Carranza	B	None	>6.0	---	---	>60	---	---	---	Moderate	Low.
Woo	B	None	>6.0	---	---	>60	---	---	---	High	Low.
149 Chaqua	B	None	>6.0	---	---	40-60	Soft	---	---	Moderate	Low.
150 Chateau	D	None	3.5-5.0	Perched	Dec-Mar	>60	---	---	---	High	Moderate.
151 Chateau	D	None	+1-3.0	Perched	Sep-Apr	>60	---	---	---	High	Moderate.
152 Checker	C	None	3.0-4.0	Perched	Oct-Mar	>60	---	---	---	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Frequency of flooding	High water table			Bedrock		Cemented pan		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
			Ft			In		In			
153------------- Chinvar	C	None------	3.0-5.0	Apparent	Dec-Mar	>60	---	---	---	High-----	Low.
154------------- Cole Variant	C	None------	3.0-4.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
155, 156, 157----- Conosta	C	None------	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
158*:											
Conosta----------	C	None------	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
Arburua----------	C	None------	>6.0	---	---	24-40	Hard	---	---	High-----	Low.
159, 160---------- Contra Costa	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate.
161, 162, 163, 164, 165--------- Damluis	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
166------------- Damluis Variant	C	None------	>6.0	---	---	>60	---	25-40	Thick	High-----	Low.
167------------- Deldota	D	None------	3.5-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
168, 169---------- Dosamigos	D	None------	3.5-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
170, 171---------- Dospalos	D	None------	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High-----	Low.
172------------- Dospalos	D	None------	3.0-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Moderate.
173*:											
Dospalos---------	D	Occasional	3.0-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Moderate.
Bolfar-----------	C	Occasional	3.0-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
174*:											
Dospalos---------	D	None------	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High-----	Low.
Urban land.											
175------------- Edminster	D	None------	1.0-3.0	Perched	Dec-Apr	>60	---	---	---	High-----	Low.
176*:											
Edminster--------	D	None------	1.0-3.0	Perched	Dec-Apr	>60	---	---	---	High-----	Low.
Kesterson--------	D	None------	1.0-3.0	Perched	Dec-Apr	>60	---	---	---	High-----	Moderate.
177------------- Edminster Variant	C	None------	3.0-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
178------------- Elnido	C	None------	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High-----	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Frequency of flooding	High water table			Bedrock		Cemented pan		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
			Ft			In		In			
179----------------- Elnido	C	None------	1.5-3.5	Perched	Oct-Mar	>60	---	---	---	High-----	Low.
180----------------- Elnido	C	None------	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High-----	Low.
181----------------- Escano	C	None------	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High-----	Low.
182----------------- Fifield	C	None------	>6.0	---	---	20-35	Hard	---	---	Moderate	Moderate.
183*:											
Fifield----------	C	None------	>6.0	---	---	20-35	Hard	---	---	Moderate	Moderate.
Gonzaga----------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
184*:											
Fifield----------	C	None------	>6.0	---	---	20-35	Hard	---	---	Moderate	Moderate.
Honker-----------	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Gonzaga----------	C	None------	>6.0	---	---	20-40	Hard	---	---	High-----	Low.
185*:											
Fifield----------	C	None------	>6.0	---	---	20-35	Hard	---	---	Moderate	Moderate.
Millsholm--------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.
186. Fluvaquents											
187----------------- Franciscan	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
188*:											
Franciscan-------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Quinto-----------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
Honker-----------	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
189*:											
Franciscan-------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Rock outcrop.											
190*, 191*:											
Gonzaga----------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Honker-----------	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
192----------------- Henmel	C	None------	3.0-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
193----------------- Herito	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
194, 195----------- Honker	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Frequency of flooding	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Thickness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
			Ft			In		In			
196*:											
Honker-----------	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Millsholm--------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.
Rock outcrop.											
197*:											
Honker-----------	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Quinto-----------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
198--------------- Kesterson	D	None------	1.0-3.0	Perched	Dec-Apr	>60	---	---	---	High-----	Moderate.
199, 200---------- Kesterson	D	None------	+1-1.5	Apparent	Sep-Apr	>60	---	---	---	High-----	Moderate.
201*:											
Kesterson--------	D	None------	1.0-3.0	Perched	Dec-Apr	>60	---	---	---	High-----	Moderate.
Edminster--------	D	None------	1.0-3.0	Perched	Dec-Apr	>60	---	---	---	High-----	Low.
202*, 203*:											
Laveaga----------	C	None------	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
Lecrag-----------	D	None------	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
204*:											
Laveaga, very stony-----------	C	None------	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
Laveaga----------	C	None------	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
205*:											
Laveaga----------	C	None------	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate.
Hytop------------	D	None------	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
206, 207, 208----- Los Banos	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
209*:											
Los Banos--------	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
Pleito-----------	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
210--------------- Los Banos Variant	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
211--------------- Marcuse	D	None------	1.0-3.0	Apparent	Nov-Apr	>60	---	---	---	High-----	Moderate.
212--------------- Marcuse	D	None------	1.5-3.0	Apparent	Dec-Mar	>60	---	---	---	High-----	Moderate.
213, 214, 215----- Millsholm	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.
216*:											
Millsholm--------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Frequency of flooding	High water table			Bedrock		Cemented pan		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Depth	Thickness	Uncoated steel	Concrete
			Ft			In		In			
216*:											
Fifield----------	C	None------	>6.0	---	---	20-35	Hard	---	---	Moderate	Moderate.
217*:											
Millsholm--------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.
Honker-----------	D	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
Rock outcrop.											
218*, 219*:											
Millsholm--------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.
Rock outcrop.											
220. Mollic Xerofluvents											
221, 222, 223----- Oneil	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
224, 225---------- Oquin	C	None------	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
226--------------- Orognen	D	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
227*:											
Orognen----------	D	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
Quiensabe--------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
228--------------- Palazzo	C	None------	3.5-5.0	Perched	Dec-Feb	>60	---	---	---	High-----	Low.
229, 230---------- Paver	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
231, 232---------- Peckham	C	None------	>6.0	---	---	20-30	Hard	---	---	Moderate	Moderate.
233*:											
Peckham----------	C	None------	>6.0	---	---	20-30	Hard	---	---	Moderate	Moderate.
Cole Variant-----	C	None------	3.0-4.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
234, 235, 236, 237-------------- Pedcat	D	None------	1.5-3.0	Perched	Dec-Mar	>60	---	---	---	High-----	Moderate.
238*. Pits											
239, 240---------- Pleito	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
241*:											
Quinto-----------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
Illito-----------	D	None------	>6.0	---	---	5-10	Hard	---	---	Moderate	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Frequency of flooding	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Thickness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
			Ft			In		In			
241*: Rock outcrop.											
242*: Quinto-----------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
Millsholm--------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate.
Rock outcrop.											
243*: Quinto-----------	D	None------	>6.0	---	---	10-20	Hard	---	---	Moderate	Low.
Rock outcrop.											
244*: Rock outcrop.											
Ararat-----------	B	None------	>6.0	---	---	40-50	Hard	---	---	Moderate	Moderate.
Illito-----------	D	None------	>6.0	---	---	5-10	Hard	---	---	Moderate	Low.
245*: Rock outcrop.											
Wisflat----------	D	None------	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
246, 247---------- San Emigdio	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
248--------------- Santanela	D	None------	+1-1.5	Perched	Sep-Apr	>60	---	---	---	High-----	Moderate.
249--------------- San Timoteo	C	None------	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
250*, 251*: San Timoteo------	C	None------	>6.0	---	---	20-40	Soft	---	---	High-----	Low.
Wisflat----------	D	None------	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
252*: Sehorn-----------	D	None------	>6.0	---	---	23-40	Hard	---	---	High-----	Low.
Contra Costa-----	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate.
253--------------- Stanislaus	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
254--------------- Stanislaus	D	None------	4.5-5.0	Perched	Apr-Oct	>60	---	---	---	High-----	Low.
255*: Stanislaus-------	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
Dosamigos--------	D	None------	3.5-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
Urban land.											
256, 257---------- Triangle	D	None------	+1-1.5	Perched	Sep-May	>60	---	---	---	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Frequency of flooding	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Thickness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
			Ft			In		In			
258----------------- Trulae	D	None------	4.0-5.0	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
259*:											
Tunehill---------	D	None------	>6.0	---	---	10-15	Soft	---	---	High-----	Low.
Quiensabe--------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
260, 261---------- Turlock	D	None------	+1-1.5	Perched	Sep-Apr	>60	---	---	---	High-----	Moderate.
262--------------- Turmound	D	None------	1.5-2.5	Perched	Sep-Mar	>60	---	---	---	High-----	Moderate.
263--------------- Vernalis	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
264*:											
Vernalis---------	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
Pedcat-----------	D	None------	1.5-3.0	Perched	Dec-Mar	>60	---	---	---	High-----	Moderate.
265--------------- Volta	D	None------	1.0-3.0	Perched	Dec-Mar	>60	---	45-55	Thick	High-----	Low.
266--------------- Volta	D	None------	3.5-5.0	Perched	Dec-Mar	>60	---	45-55	Thick	High-----	Moderate.
267--------------- Wekoda	D	None------	1.5-2.5	Perched	Dec-Mar	>60	---	---	---	High-----	Low.
268*, 269*:											
Wisflat----------	D	None------	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Arburua----------	C	None------	>6.0	---	---	24-40	Hard	---	---	High-----	Low.
270*, 271*, 272*:											
Wisflat----------	D	None------	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Rock outcrop.											
Arburua----------	C	None------	>6.0	---	---	24-40	Hard	---	---	High-----	Low.
273*:											
Wisflat----------	D	None------	>6.0	---	---	10-20	Hard	---	---	High-----	Low.
Rock outcrop.											
Oneil------------	C	None------	>6.0	---	---	20-40	Hard	---	---	Moderate	Low.
274, 275, 276, 277, 278--------- Woo	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
279--------------- Woo	C	None------	4.0-6.0	Perched	Apr-Oct	>60	---	---	---	High-----	Low.
280--------------- Woo	C	None------	>6.0	---	---	>60	---	---	---	High-----	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Frequency of flooding	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Cemented pan: Depth	Cemented pan: Thickness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
			Ft			In		In			
281*:											
Woo----------------	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
Anela------------	B	Rare------	>6.0	---	---	>60	---	---	---	High-----	Low.
Urban land.											
282*:											
Woo loam---------	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
Woo clay loam----	C	None------	4.0-6.0	Perched	Apr-Oct	>60	---	---	---	High-----	Low.
Urban land.											
283, 284. Xerofluvents											
285--------------- Yokut	B	None------	>6.0	---	---	>60	---	---	---	High-----	Low.
286--------------- Yokut	B	Rare------	>6.0	---	---	>60	---	---	---	High-----	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Agnal	Fine, montmorillonitic, thermic Cumulic Haplaquolls
Akad	Loamy-skeletal, mixed, thermic Mollic Haploxeralfs
Alros*	Fine-loamy, mixed (calcareous), thermic Typic Haplaquepts
Altamont Variant	Fine, montmorillonitic, thermic Typic Chromoxererts
Anela	Loamy-skeletal, mixed, thermic Cumulic Haploxerolls
Apollo	Fine-loamy, mixed, thermic Calcic Haploxerolls
Ararat	Loamy-skeletal, mixed, thermic Pachic Ultic Haploxerolls
Arbuckle Variant	Fine-loamy, mixed, thermic Typic Haploxeralfs
Arburua	Fine-loamy, mixed (calcareous), thermic Typic Xerorthents
Asolt	Fine, montmorillonitic, thermic Typic Chromoxererts
Ayar	Fine, montmorillonitic, thermic Typic Chromoxererts
Ballvar	Fine-loamy, mixed, thermic Typic Haploxerolls
Bapos	Fine, mixed, thermic Mollic Palexeralfs
Bisgani	Sandy, mixed, thermic Typic Haplaquolls
Bolfar	Fine-loamy, mixed (calcareous), thermic Cumulic Haplaquolls
Britto	Fine, montmorillonitic, thermic Typic Natraqualfs
Capay**	Fine, montmorillonitic, thermic Typic Chromoxererts
Carranza	Fine-loamy, mixed, thermic Pachic Haploxerolls
Chaqua	Fine-loamy, mixed, thermic Calcixerollic Xerochrepts
Chateau	Fine, mixed, thermic Aquic Xerochrepts
Checker	Fine-loamy, mixed, thermic Calcixerollic Xerochrepts
Chinvar	Fine-loamy, mixed, thermic Aquic Haploxerolls
Cole Variant	Fine, mixed, thermic Pachic Argixerolls
Conosta	Fine, mixed, thermic Mollic Haploxeralfs
Contra Costa	Fine, mixed, thermic Mollic Haploxeralfs
Damluis	Fine, montmorillonitic, thermic Calcic Pachic Argixerolls
Damluis Variant	Fine, montmorillonitic, thermic Typic Durixerolls
Deldota	Fine, montmorillonitic, thermic Vertic Haploxerolls
Dosamigos	Fine, montmorillonitic, thermic Aquic Haploxerolls
Dospalos	Fine, montmorillonitic (calcareous), thermic Vertic Haplaquolls
Edminster	Fine-loamy, mixed, thermic Glossic Natraqualfs
Edminster Variant	Sandy over loamy, mixed, thermic Aquic Xerofluvents
Elnido	Coarse-loamy, mixed, thermic Typic Haplaquolls
Escano	Fine-loamy, mixed (calcareous), thermic Typic Haplaquolls
Fifield	Loamy-skeletal, mixed, thermic Ultic Argixerolls
Franciscan	Fine-loamy, mixed, thermic Typic Argixerolls
Gonzaga	Fine, mixed, thermic Typic Palexerolls
Henmel	Fine, montmorillonitic, thermic Typic Argiaquolls
Herito	Fine, montmorillonitic, thermic Typic Palexeralfs
Honker	Fine, mixed, thermic Mollic Palexeralfs
Hytop	Fine, mixed, thermic Typic Palexeralfs
Illito	Loamy-skeletal, mixed, thermic Lithic Argixerolls
Kesterson	Fine-loamy, mixed, thermic Glossic Natraqualfs
Laveaga	Fine, mixed, mesic Typic Argixerolls
Lecrag	Fine, montmorillonitic, mesic Typic Chromoxererts
Los Banos	Fine, mixed, thermic Typic Haploxeralfs
Los Banos Variant	Fine-loamy, mixed, thermic Typic Argixerolls
Marcuse	Fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Millsholm	Loamy, mixed, thermic Lithic Xerochrepts
Oneil	Fine-silty, mixed, thermic Calcic Haploxerolls
Oquin	Coarse-loamy, mixed, thermic Calcic Haploxerolls
Orognen	Fine, mixed, thermic Typic Palexeralfs
Palazzo	Fine-loamy, mixed, thermic Fluvaquentic Haplaquolls
Paver	Fine-loamy, mixed, nonacid, thermic Xeric Torriorthents
Peckham	Loamy-skeletal, mixed, thermic Typic Haploxeralfs
Pedcat	Fine, mixed, thermic Aquic Natrixeralfs
Pleito***	Fine-loamy, mixed, thermic Calcic Pachic Haploxerolls
Quiensabe	Fine, mixed, thermic Typic Argixerolls
Quinto	Loamy, mixed, thermic Lithic Mollic Haploxeralfs
San Emigdio	Coarse-loamy, mixed (calcareous), thermic Typic Xerofluvents

See footnotes at end of table.

TABLE 17.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
San Timoteo	Coarse-loamy, mixed (calcareous), thermic Typic Xerorthents
Santanela	Fine-loamy, mixed, thermic Typic Natraqualfs
Sehorn**	Fine, montmorillonitic, thermic Entic Chromoxererts
Stanislaus	Fine, montmorillonitic, thermic Typic Haploxerolls
Triangle	Fine, montmorillonitic, thermic Aquic Chromoxererts
Trulae	Very fine, montmorillonitic, thermic Aquic Chromoxererts
Tunehill	Loamy, mixed, thermic, shallow Typic Haploxerolls
Turlock	Fine-loamy, mixed, thermic Albic Natraqualfs
Turmound	Fine-loamy, mixed, thermic Glossic Natraqualfs
Vernalis**	Fine-loamy, mixed, thermic Calcixerollic Xerochrepts
Volta	Fine, mixed, thermic Typic Natraqualfs
Wekoda	Fine, montmorillonitic, thermic Aquic Chromoxererts
Wisflat	Loamy, mixed (calcareous), thermic Lithic Xerorthents
Woo	Fine-loamy, mixed, thermic Calcic Haploxerolls
Yokut	Loamy-skeletal, mixed, thermic Typic Haploxeralfs

* The soils in map unit 104 are taxadjuncts to the series.
** The soils are taxadjuncts to the series.
*** The soils in map units 209 and 239 are taxadjuncts to the series.

* U.S. GOVERNMENT PRINTING OFFICE: 1990-261-567/20001

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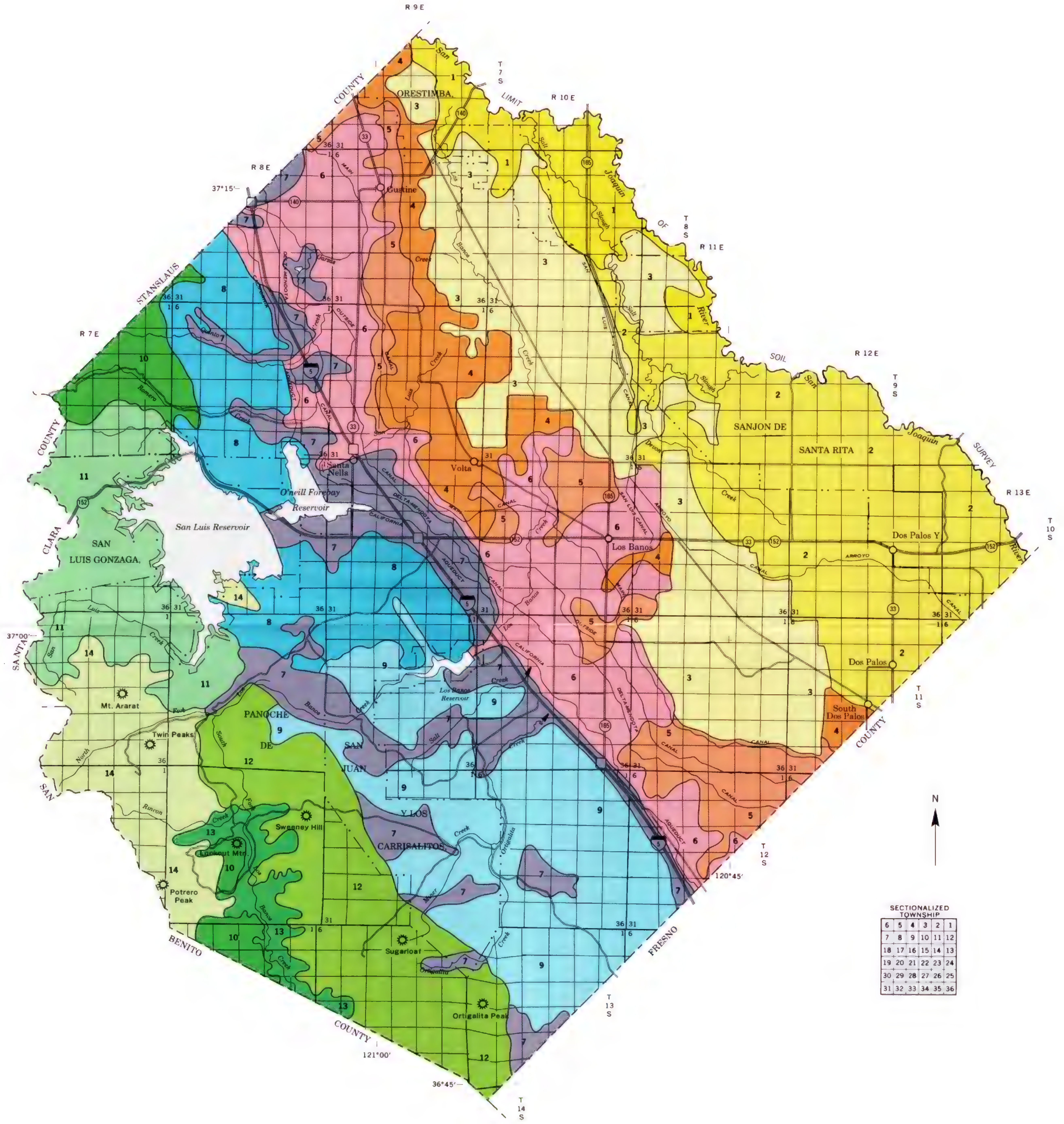


LEGEND

SOILS IN THE BASIN, ON THE BASIN RIM, AND ON ALLUVIAL FANS OF THE SAN JOAQUIN VALLEY

1 EDMINSTER-DOSPALOS-KESTERSON: Very deep, nearly level, poorly drained soils that have hummocky microrelief; in the valley basin

2 BOLFAR-DOSPALOS-ALROS: Very deep, nearly level, poorly drained soils that are partially drained; in the valley basin

3 TRIANGLE-TURLOCK-BRITTO: Very deep, nearly level, very poorly drained soils; in the valley basin and on the valley basin rim

4 PEDCAT-MARCUSE-VOLTA: Deep and very deep, nearly level, poorly drained soils; on alluvial fans and the valley basin rim

SOILS ON ALLUVIAL FANS OF THE SAN JOAQUIN VALLEY

5 DOSAMIGOS-DELDOTA-CHATEAU: Very deep, nearly level, poorly drained and somewhat poorly drained soils that are partially drained; on low alluvial fans

6 WOO-STANISLAUS: Very deep, nearly level to gently sloping, well drained soils; on alluvial fans

SOILS ON TERRACES ADJACENT TO THE WESTERN EDGE OF THE SAN JOAQUIN VALLEY

7 DAMLUIS-BAPOS-LOS BANOS: Very deep, nearly level to strongly sloping, well drained soils; on terraces

SOILS ON FOOTHILLS OF THE COAST RANGE

8 ONEIL-APOLLO: Moderately deep and deep, gently sloping to steep, well drained soils that have high organic matter content; on foothills

9 ARBURUA-WISFLAT: Shallow and moderately deep, gently sloping to very steep; well drained soils that have low organic matter content; on foothills

SOILS ON MOUNTAINS AND IN VALLEYS OF THE COAST RANGE

10 FRANCISCAN-QUINTO-ROCK OUTCROP: Shallow and moderately deep, steep and very steep, well drained and somewhat excessively drained soils, and Rock outcrop; on mountains

11 MILLSHOLM-FIFIELD-HONKER: Shallow and moderately deep, moderately sloping to very steep, well drained soils; on mountains

12 MILLSHOLM-QUINTO-CONTRA COSTA: Shallow and moderately deep, moderately sloping to very steep, well drained and somewhat excessively drained soils; on mountains

13 QUIENSABE-OROGNEN-TUNEHILL: Shallow, moderately deep, and very deep, gently sloping to steep, well drained soils; on terraces

14 PECKHAM-ARARAT-LAVEAGA: Moderately deep and deep, gently sloping to very steep, well drained soils; on volcanic mountains

Compiled 1989

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
REGENTS OF THE UNIVERSITY OF CALIFORNIA
AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

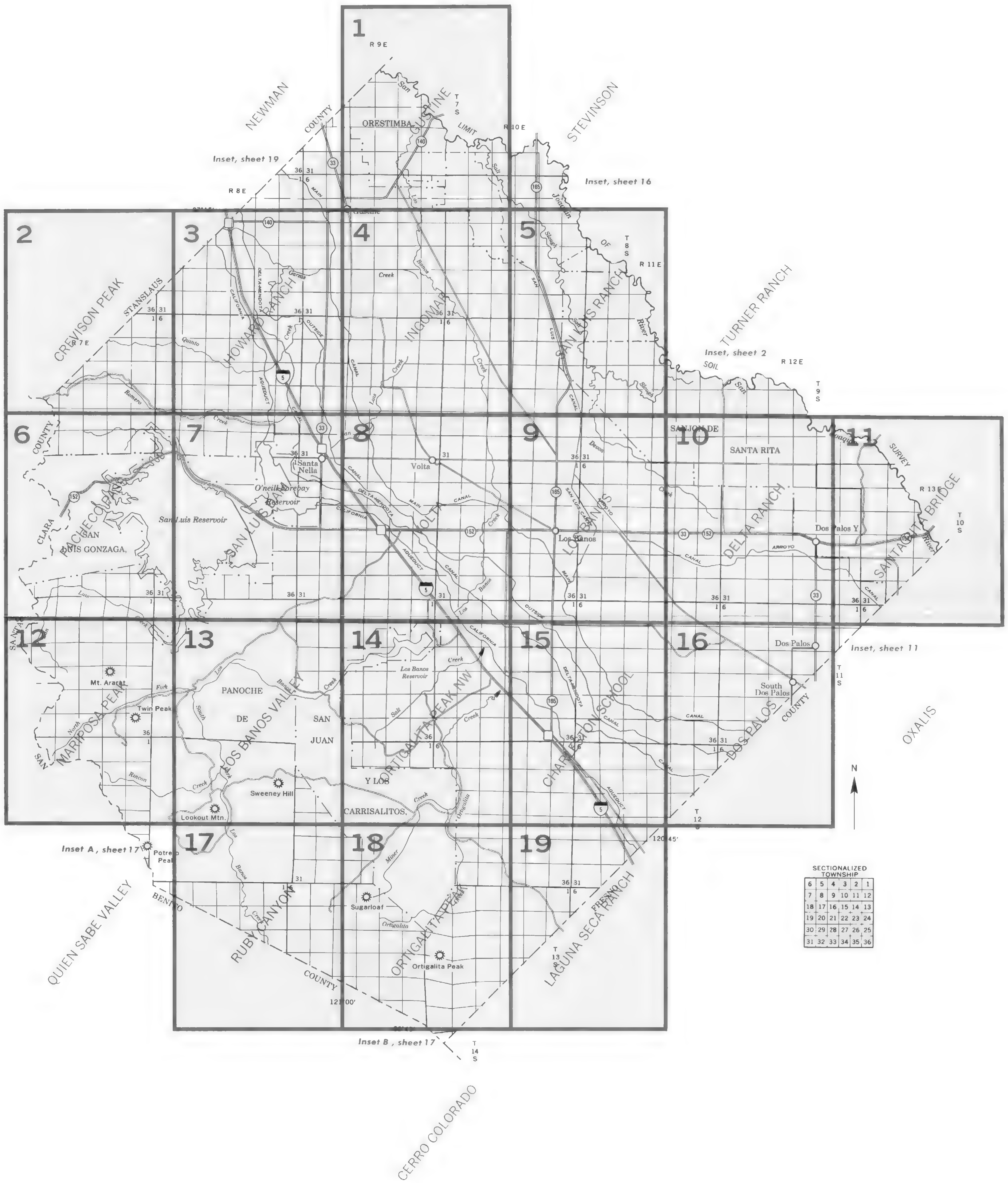
MERCED COUNTY, CALIFORNIA
WESTERN PART

Scale 1:190,080

1 0 1 2 3 Mi

1 0 3 6 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

MERCED COUNTY, CALIFORNIA
WESTERN PART

Scale 1:190,080

Errata:
On map sheet 7, in the northeast corner of the sheet, the symbol 223 should be corrected to 253. The delineation northwest of Santa Nellis Village that does not have a symbol should have the symbol 220. The delineation that shows "Volta Wasteway" should have the symbol 133.

SOIL LEGEND

SYMBOL	NAME
101	Agnal clay loam
102	Akad-Conosta association, 30 to 50 percent slopes
103	Alros clay loam, partially drained
104	Alros clay loam
105	Altamont Variant-Hytop complex, 30 to 50 percent slopes
106	Anela gravelly loam, 0 to 2 percent slopes
107	Anela very gravelly sandy loam, 2 to 8 percent slopes
108	Anela very gravelly sandy loam, 8 to 15 percent slopes
109	Apollo clay loam, 2 to 8 percent slopes
110	Apollo clay loam, 8 to 15 percent slopes
111	Apollo clay loam, 15 to 30 percent slopes
112	Ararat extremely stony loam, 5 to 30 percent slopes
113	Ararat-Gonzaga complex, 30 to 50 percent slopes
114	Ararat-Peckham complex, 8 to 30 percent slopes
115	Ararat-Peckham complex, 30 to 50 percent slopes
116	Arbuckle Variant sandy loam
117	Arburua loam, 2 to 8 percent slopes
118	Arburua loam, 8 to 15 percent slopes
119	Arburua loam, 15 to 30 percent slopes
120	Arburua loam, 30 to 50 percent slopes
121	Asolt very stony clay, 15 to 30 percent slopes
122	Asolt very stony clay, 30 to 50 percent slopes
123	Ayar clay, 5 to 8 percent slopes
124	Ayar clay, 8 to 15 percent slopes
125	Ayar clay, 15 to 30 percent slopes
126	Ayar clay, 30 to 50 percent slopes
127	Ayar-Arburua complex, 8 to 15 percent slopes
128	Ayar-Arburua complex, 15 to 30 percent slopes
129	Ayar-Arburua complex, 30 to 50 percent slopes
130	Ayar-Oneil complex, 30 to 50 percent slopes
131	Ballvar loam, 2 to 8 percent slopes
132	Ballvar-Pedcat, eroded association, 0 to 5 percent slopes
133	Bapos sandy clay loam, 0 to 2 percent slopes
134	Bapos clay loam, 2 to 8 percent slopes
135	Bapos clay loam, 8 to 15 percent slopes
136	Bapos-Arburua complex, 8 to 15 percent slopes
137	Bisgani loamy sand, partially drained
138	Bisgani clay loam , occasionally flooded
139	Bolfar clay loam, partially drained
140	Bolfar clay loam, hummocky
141	Britto clay loam
142	Britto clay loam, leveled
143	Britto clay loam, ponded
144	Capay clay loam
145	Capay clay
146	Carranza gravelly loam, 0 to 2 percent slopes
147	Carranza gravelly clay loam, 2 to 8 percent slopes
148	Carranza-Woo complex, 0 to 2 percent slopes
149	Chaqua loam, 2 to 8 percent slopes
150	Chateau clay, partially drained
151	Chateau clay, ponded
152	Checker loam
153	Chinvar loam
154	Cole Variant clay loam, 2 to 5 percent slopes
155	Conosta clay loam, 2 to 8 percent slopes
156	Conosta clay loam, 8 to 15 percent slopes
157	Conosta clay loam, 15 to 30 percent slopes
158	Conosta-Arburua complex, 15 to 30 percent slopes
159	Contra Costa loam, 30 to 50 percent slopes
160	Contra Costa loam, 50 to 65 percent slopes
161	Damluis clay loam, 0 to 2 percent slopes
162	Damluis clay loam, 2 to 8 percent slopes
163	Damluis gravelly clay loam, 0 to 2 percent slopes
164	Damluis gravelly clay loam, 2 to 8 percent slopes
165	Damluis gravelly clay loam, 8 to 15 percent slopes
166	Damluis Variant clay loam
167	Deldota clay, partially drained
168	Dosamigos clay loam, partially drained
169	Dosamigos clay, partially drained
170	Dospalos clay loam, partially drained
171	Dospalos clay, partially drained
172	Dospalos clay, hummocky
173	Dospalos-Bolfar complex, occasionally flooded
174	Dospalos-Urban land complex, partially drained
175	Edminster loam
176	Edminster-Kesterson complex
177	Edminster Variant sand
178	Elnido sandy loam, partially drained
179	Elnido sandy loam, wet
180	Elnido clay loam, partially drained
181	Escano clay loam, partially drained
182	Fifield sandy loam, 50 to 65 percent slopes
183	Fifield-Gonzaga complex, 30 to 50 percent slopes
184	Fifield-Honker-Gonzaga complex, 50 to 65 percent slopes
185	Fifield-Millsholm complex, 30 to 50 percent slopes
186	Fluvaquents, channeled
187	Franciscan sandy loam, 50 to 70 percent slopes
188	Franciscan-Quinto-Honker complex, 50 to 75 percent slopes
189	Franciscan-Rock outcrop complex, 30 to 50 percent slopes
190	Gonzaga-Honker complex, 30 to 50 percent slopes
191	Gonzaga-Honker complex, 50 to 65 percent slopes
192	Henmel clay loam, partially drained
193	Herito loam
194	Honker sandy loam, 30 to 50 percent slopes
195	Honker sandy loam, 50 to 65 percent slopes
196	Honker-Millsholm-Rock outcrop complex, 30 to 50 percent slopes
197	Honker-Quinto complex, 30 to 50 percent slopes
198	Kesterson sandy loam
199	Kesterson sandy loam, ponded
200	Kesterson loam, ponded
201	Kesterson-Edminster complex
202	Laveaga-Lecrag complex, 30 to 50 percent slopes
203	Laveaga-Lecrag complex, 50 to 75 percent slopes
204	Laveaga complex, 30 to 50 percent slopes
205	Laveaga-Hytop complex, 50 to 65 percent slopes
206	Los Banos clay loam, 0 to 2 percent slopes
207	Los Banos clay loam, 2 to 8 percent slopes
208	Los Banos clay loam, 8 to 15 percent slopes
209	Los Banos-Pleito clay loams, 2 to 8 percent slopes
210	Los Banos Variant gravelly sandy clay loam
211	Marcuse silty clay
212	Marcuse clay, leveled
213	Millsholm loam, 8 to 15 percent slopes
214	Millsholm loam, 30 to 50 percent slopes
215	Millsholm loam, 50 to 65 percent slopes
216	Millsholm-Fifield complex, 30 to 50 percent slopes
217	Millsholm-Honker-Rock outcrop complex, 30 to 50 percent slopes
218	Millsholm-Rock outcrop complex, 15 to 30 percent slopes
219	Millsholm-Rock outcrop complex, 30 to 50 percent slopes
220	Mollic Xerofluvents, channeled
221	Oneil silt loam, 8 to 15 percent slopes
222	Oneil silt loam, 15 to 30 percent slopes
223	Oneil silt loam, 30 to 50 percent slopes
224	Oquin fine sandy loam, 2 to 8 percent slopes
225	Oquin fine sandy loam, 15 to 30 percent slopes
226	Orognen sandy loam, 2 to 5 percent slopes
227	Orognen-Quiensabe complex, 30 to 50 percent slopes
228	Palazzo sandy loam, partially drained
229	Paver clay loam, 0 to 2 percent slopes
230	Paver clay loam, 2 to 5 percent slopes
231	Peckham cobbly loam, 2 to 5 percent slopes
232	Peckham cobbly loam, 5 to 15 percent slopes
233	Peckham-Cole Variant association, 2 to 30 percent slopes
234	Pedcat loam, 0 to 2 percent slopes
235	Pedcat loam, 0 to 2 percent slopes, eroded
236	Pedcat clay loam, leveled, 0 to 2 percent slopes
237	Pedcat clay, 0 to 2 percent slopes, severly eroded
238	Pits
239	Pleito gravelly clay loam, 8 to 15 percent slopes
240	Pleito gravelly clay loam, 15 to 30 percent slopes
241	Quinto-Illito-Rock outcrop complex, 30 to 50 percent slopes
242	Quinto-Millsholm-Rock outcrop complex, 40 to 75 percent slopes
243	Quinto-Rock outcrop complex, 50 to 75 percent slopes
244	Rock outcrop-Ararat-Illito complex, 30 to 75 percent slopes
245	Rock outcrop-Wisflat complex, 30 to 75 percent slopes
246	San Emigdio fine sandy loam
247	San Emigdio loam
248	Santanela loam
249	San Timoteo sandy loam, 2 to 8 percent slopes
250	San Timoteo-Wisflat sandy loams complex, 8 to 15 percent slopes
251	San Timoteo-Wisflat sandy loams complex, 15 to 30 percent slopes
252	Sehorn-Contra Costa complex, 30 to 50 percent slopes
253	Stanislaus clay loam
254	Stanislaus clay loam, wet
255	Stanislaus-Dosamigos-Urban land complex
256	Triangle clay
257	Triangle clay, sodic
258	Trulae silty clay, partially drained
259	Tunehill-Quiensabe complex, 30 to 50 percent slopes
260	Turlock sandy loam
261	Turlock loam, leveled
262	Turmound sandy loam
263	Vernalis loam, 2 to 5 percent slopes
264	Vernalis-Pedcat, eroded complex, 2 to 5 percent slopes
265	Volta clay loam
266	Volta clay loam, partially drained
267	Wekoda clay, partially drained
268	Wisflat-Arburua complex, 15 to 30 percent slopes
269	Wisflat-Arburua complex, 30 to 50 percent slopes
270	Wisflat-Rock outcrop-Arburua complex, 15 to 30 percent slopes
271	Wisflat-Rock outcrop-Arburua complex, 30 to 50 percent slopes
272	Wisenor-Rock outcrop-Arburua complex, 50 to 75 percent slopes
273	Wisflat-Rock outcrop-Arburua complex, 50 to 75 percent slopes
274	Woo loam, 0 to 2 percent slopes
275	Woo loam, gravelly substratum, 0 to 2 percent slopes
276	Woo sandy clay loam, 0 to 2 percent slopes
277	Woo clay loam, 0 to 2 percent slopes
278	Woo clay loam, 2 to 5 percent slopes
279	Woo clay loam, wet, 0 to 2 percent slopes
280	Woo clay, 0 to 2 percent slopes
281	Woo-Anela-Urban land complex, 0 to 2 percent slopes
282	Woo-Urban land complex, 0 to 2 percent slopes
283	Xerofluvents, channeled
284	Xerofluvents, extremely gravelly
285	Yokut sandy loam
286	Yokut loam

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

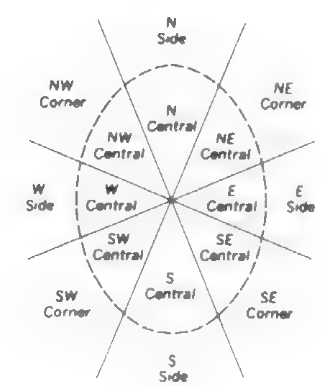
SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

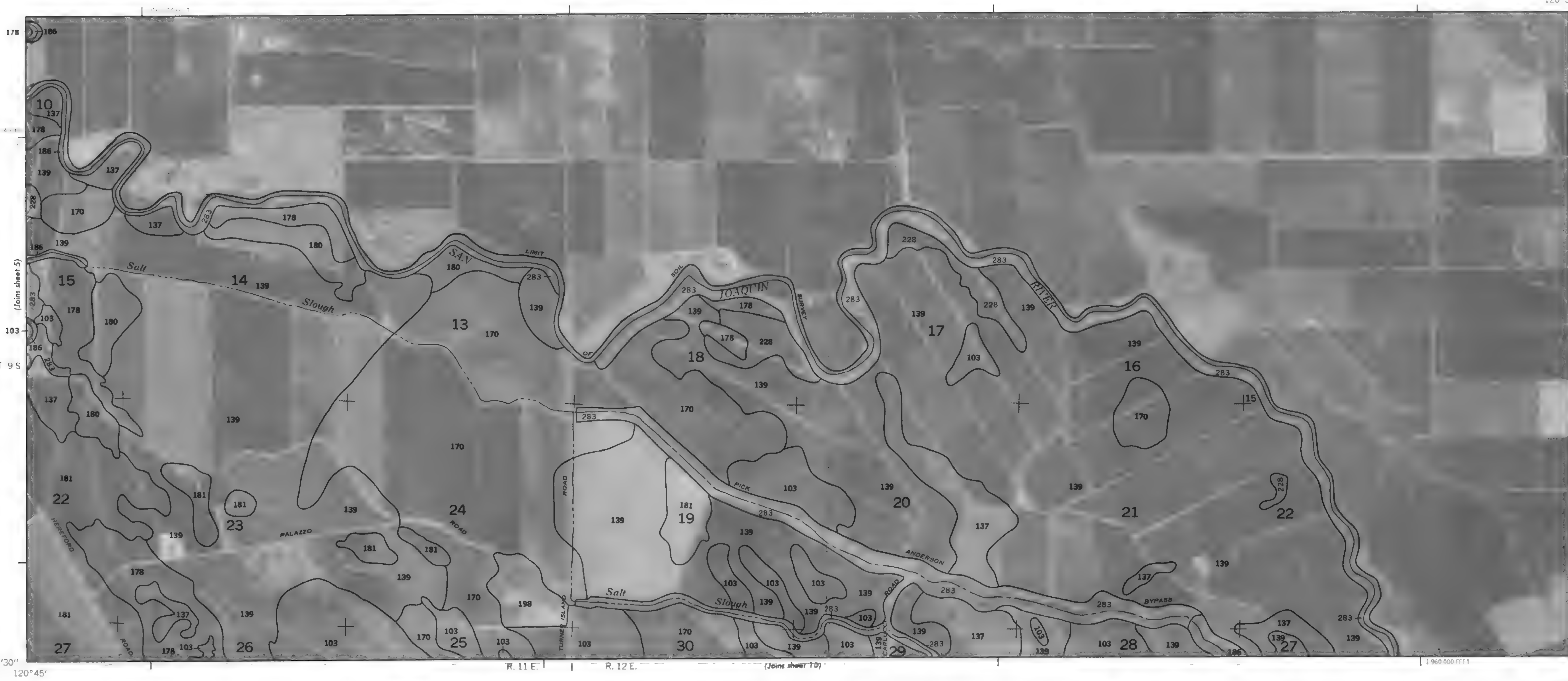
Soil	Map-Sheet	Location
Agnal	1	SE Central
Akad	7	NW Corner
Airos	10	NW Corner
Altamount Variant	12	W Side
Anela	7	N Side
Apollo	8	SW Central
Ararat	17	NW Corner
Arbuckle Variant	8	NW Corner
Arburua	14	SW Corner
Asolt	7	SW Corner
Ayar	7	SE Corner
Balvar	7	S Side
Bapos	18	NE Corner
Bisgani	10	N Side
Bolfar	10	NE Corner
Britto	15	N Side
Capay	9	SW Corner
Carranza	7	N Side
Chaqua	14	NW Central
Chateau	16	S Central
Checker	9	SE Corner
Chinvar	4	S Side
Cole Variant	12	SE Corner
Conosta	14	NW Corner
Contra Costa	6	S Central
Damluis	7	E Central
Damluis Variant	7	E Side
Deldota	16	SW Corner
Dosamigos	4	W Side
Dospalos	9	NE Corner
Edminster	Inset to 16	SE Corner
Edminster Variant	1	SE Corner
Elnido	9	NE Corner
Escano	11	NW Central
Fifield	6	NW Corner
Fluvaquents	11	N Central
Franciscan	2	S Central
Gonzaga	6	N Central
Henmel	9	NW Corner
Herito	3	SW Corner
Honker	6	N Central
Hytop	12	NE Central
Illito	17	NW Corner
Kesterson	Inset to 16	SE Corner
Laveaga	12	S Central
Lecrag	12	S Central
Los Banos	14	N Side
Los Banos Variant	3	SE Corner
Marcuse	5	S Central
Millsholm	6	S Central
Mollic Xerofluvents	13	N Central
Onell	13	N Side
Oquin	3	NW Corner
Orognen	17	NE Central
Palazzo	11	NW Corner
Paver	15	SE Corner
Peckham	12	SE Corner
Pedcat	4	S Central
Pleito	19	NE Corner
Quensabe	17	NW Corner
Quinto	2	SE Central
San Emigdio	3	NE Central
San Timoteo	14	SW Central
Santenela	4	S Side
Sehorn	2	SE Central
Stanislaus	3	N Central
Triangle	4	SE Corner
Trulae	4	SE Corner
Tunehill	13	SW Corner
Turlock	4	E Side
Turmound	4	E Side
Veranalis	19	NW Corner
Volta	4	SW Corner
Wekoda	16	NE Central
Wisflat	14	SW Central
Woo	15	NW Corner
Xerofluvents	11	NE Central
Yokut	3	N Side

Guide to Soil Sites



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1970 to 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000


120°37'30"
37°10'
(Joins sheet 5)
T. 9 S.
SAN JOAQUIN RIVER
Salt Slough
PALAZZO ROAD
PICK ANDERSON ROAD
BYPASS
37°07'30"
120°45'
R. 11 E. | R. 12 E.
(Joins sheet 10)


120°37'30"
37°13'
T. 8 S.
T. 9 S.
(Joins sheet 3)
Mustang Creek
STANISLAUS CO.
MERCED CO.
Quinto Creek
Romero Creek
MCCABE ROAD
Red Hill Road
SANTA CLARA CO.
MERCED CO.
37°07'30"
121°15'
R. 7 E. | R. 8 E.
(Joins sheet 6)

2 MILES
2 KILOMETERS
SCALE 1:24 000

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
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SCALE 1:24 000

SCALE 1:24 000
1 MILE
2 MILES
2 KILOMETERS

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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2 MILES
2 KILOMETERS
SCALE 1:24 000

(Joins sheet 5)

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3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

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1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 2 KILOMETERS

SCALE 1:24 000

SCALE 1:24 000
1 ½ 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

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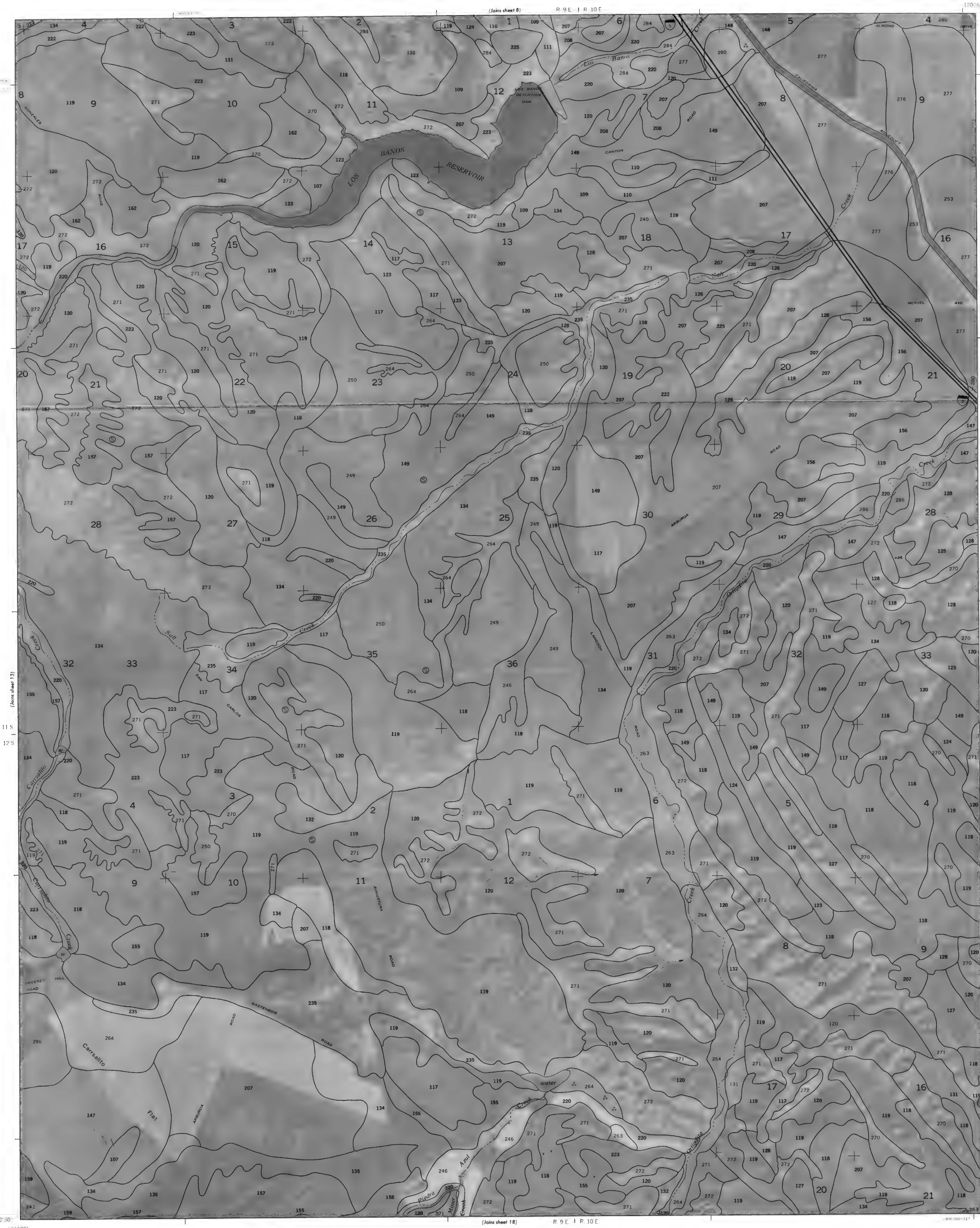

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SCALE 1:24 000

2 MILES
2 KILOMETERS
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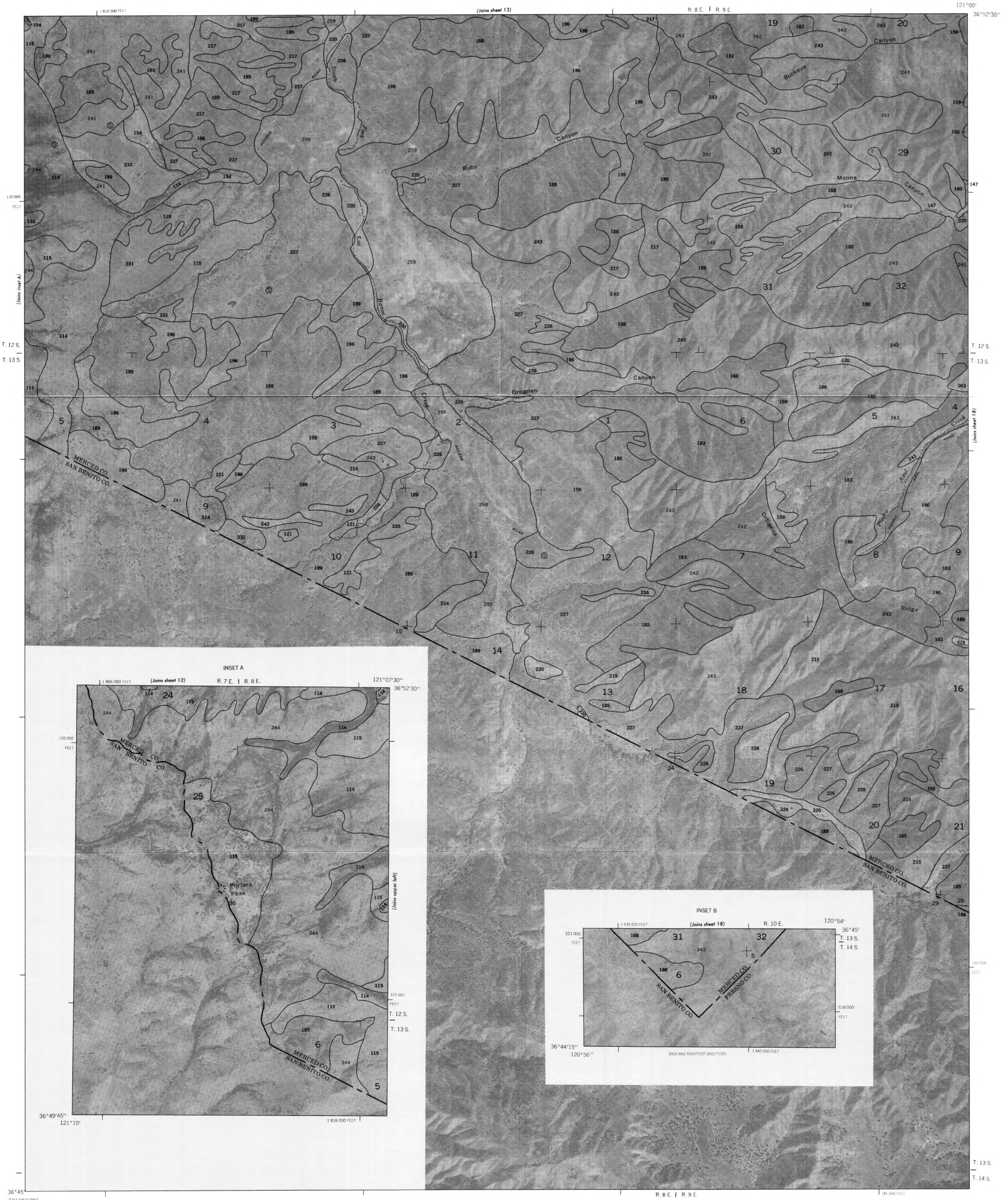

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1 0.5 0 1 2 KILOMETERS
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SCALE 1:24 000